ELECTRICAL REVIEW

and WESTERN ELECTRICIAN with which is consolidated ELECTROCRAFT

VOL. 68. CHICAGO, SATURDAY, MARCH 4, 1916. No. 10.

EDITORIALS

EXTENSIONS OF SERVICE.

Policies with respect to extensions of service by central-station companies differ quite widely in different parts of the country. Extensions are usually made without question upon requests for service from points within the thickly populated district which is included in the area covered by a franchise. Accretions of load usually follow rapidly in such territory and there is no question as to the propriety of extensions as a matter either of finance or of policy. If the district be not thickly settled, it is not so obvious that the company should make an extension and in many jurisdictions this is not done unless the prospective consumer is willing to bear at least a portion of the expense. In some states the public utilities commissions have adopted definite rules with regard to the conditions under which extensions are to be made at the expense of the company, and under which conditions the customer shall be required to pay for the installation.

Where the consumer pays for an extension it is usually regarded as a temporary investment upon his part. Ultimately the title to such extension should come to be vested in the utility. There are various methods of repaying the customer for his initial investment, the ultimate aim being to repay the total amount by the time sufficient load is secured upon the extended line to warrant the company in making the extension. In some cases a certain fraction of the cost is credited each year against the bills of the consumer; in others he receives a refund of a certain portion as each new customer becomes connected to the same line; in others a lump sum may be paid when the load has developed to the required point. The Railroad Commission of California has adopted a rule according to which payments made by the consumers in that state to secure extensions are regarded as loans to the utility company and must eventually be repaid with interest computed at six per cent per annum, under reasonable regulations.

Even where extensions are made by the utility company, it is not usually regarded as necessary that each extension should of itself be profitable to the company and that the latter should not decline to make an extension on this score alone. Franchise conditions, of course, have a bearing here, but in any case the prospect of future profit should be given consideration. The general attitude on this point, however, is of course subject to change and may be influenced by recent rulings of the United States Supreme Court. That tribunal in recent railroad rate cases has made it clear that in adjusting rates, a particular rate may not be lowered beyond the point where it ceases to be compensatory. In other words, the attitude is taken that each portion of the business of a utility should be self-sustaining, and that one class of customers should not be given a rate or a service at a loss, so that other classes are required to pay more than a reasonable amount in order to make up the deficit. While the question of rates, to which this principle has been directly applied, is not entirely analogous to the question of extensions, it may, nevertheless, have some bearing upon this matter. The idea is, however, not so much to make each individual consumer yield a profit as to secure equity between different classes of consumers.

WHY IS THE JOBBER?

The question as to the necessity for the existence of the middleman springs up perennially in nearly every line of trade. By many he is regarded as a parasite. This point of view has probably arisen from the existence, in certain lines of trade, such as perishable provisions, of the commission man who assumes no risk, carries no stock of his own, often fails to protect the interests of his clients, yet frequently pockets a large profit. The electrical jobber falls in a different class. He carries his own stock, does canvassing and publicity work, and offers to the dealer and contractor a service which cannot be secured in any other way.

The advantages to the manufacturer in handling trade through the jobber are well presented by Mr. J. W. Wooley in an interview which will be found on other pages of this issue. It is found that savings in the expense of handling orders, in freight, in traveling salesmen, and other items, more than compensate for the discount allowed to the jobber. In other words, the latter renders a service which is fully equal to the compensation collected by him, and he has justified his claim to a place in the chain of distribution.

Whether the manufacturer should confine his dealings to the jobber is, of course, another matter, and must depend to a certain extent upon the nature of the business. The firm which Mr. Wooley represents has found it advantageous to handle all of its business through the jobber. The greatest advantage to the manufacturer will probably be secured from the jobber's services when this policy is definitely adopted.

THE POWER LOAD.

In the early days of the central-station industry, the lighting load constituted the principal output and the principal source of income. As the motor load developed and increased in importance, the lighting element, while still increasing, became of less comparative importance. This tendency was emphasized when the tungsten lamp appeared on the market, and the more recent advent of the gas-filled incandescent lamp, operating at approximately one-half watt per candle, has given it still greater emphasis. Today the lighting load still preponderates in some systems, while in others the motor load has outdistanced it.

We look forward to still greater developments in this direction. Electric energy is finding wider and ever wider applications in industry, and its demand for operating railroads will undoubtedly increase. Every advance in the efficiency of electric illuminants tends to lessen the importance of that element of consumption in comparison. The lighting needs of each individual are far less than the needs for power either in his own work, or in the work of others to supply his wants. As more and more of this work is done electrically, the saturated condition of electric supply must be one in which lighting is but a small element.

Since the supply of power was at first in the nature of a by-product, it was natural to expect the revenue from lighting to pay the fixed charges of the plant, and the rates per unit of energy were made lower for power applications. This was also necessary to get the business. With the consumption of power in large blocks, however, it is possible to pay all the costs on a low rate, owing to the superior load-factor and to the economies resulting from the diversity of different loads. This fact is not generally recognized by the public, and even some engineers claim that the lighting customers of a central station are helping to pay the costs of energy delivered to the power customers. They overlook the fact that it is the poor load-factor and the high cost of distribution which make the lighting rate so comparatively high. With the ultimate development of the power load it is probable that the bulk of the revenue will come from this business, and it will necessarily be self-supporting. When energy for lighting becomes little more than a by-product, the rate charged to the small lighting customer will be largely a matter of public policy, and it will be more feasible to serve this class at a flat rate, with the elimination of the cost of metering.

Recent experience in England has demonstrated the importance of the motor load, and its place in producing revenue. Enormous curtailment in the use of lighting has seriously embarrassed those central stations whose principal output was consumed in that way, while at the same time plants supplying large power loads are having the most successful year in their history. This results because industrial activity causes power consumption at a rate that more than overbalances any decrease of output for lighting. Finances are threatened only by the high price of coal.

ELECTRICAL PROSPERITY WEEK—THE RESULTS.

During the early days of the campaign incident to the holding of Electrical Prosperity Week, we prophesied that the industry would be entirely satisfied with the results. We believed at that time that there would be certain tangible returns apparent as a result of the propaganda, but we also made a mental reservation that the intangible results would be far greater than the apparent returns.

It appears that our most sanguine expectations were more than realized. The Society for Electrical Development, under whose auspices Electrical Prosperity Week was carried out, has wisely gathered together a fine collection of facts relating to the tangible evidences of the success of Electrical Prosperity Week. This has been published in a 48-page book entitled "The Story of the Week." If any student of publicity and co-ordinated industry effort were in need of a tonic "The Story of the Week" may be safely recommended as a palliative for a jaded mental attitude with regard to faith in human responsiveness.

The writers of "The Story of the Week" have not prepared dry statistics dealing with the tons of advertising secured and the numbers of electrical appliances sold or houses wired. They have all this, but in addition have garnered from the four corners of the country the personal testimony of the leaders of the industry who have been affected by the returns and know whereof they speak. Electrical Prosperity Week was a distinct and lasting success—"The Story of the Week" proves it.

Coming as it does just when we are beginning the campaign for the "Wire Your Home Month," March 15 to April 15, "The Story of the Week" will inspire confidence in those who have had, because of their lack of proper information, any doubt as to the effectiveness of an effort of this kind. And we sincerely hope that it will convert all who have remained outside of this concerted effort and bring them to the support of those now carrying on the work.

SINGLE-PHASE ELECTRIFICATION IN SWITZERLAND.

The announcement has been made that all of the Swiss steam railroads will be electrified in the near future, and now comes the news that the management has decided upon 16-cycle single-phase operation for all electrification hereafter made.

The first installations of the single-phase system were not very enthusiastically received, and for a long time there seemed to be doubts of its success. Of late, however, it has been increasing in favor, and this decision shows that the Swiss engineers feel satisfied that it will best meet their operating conditions. However, the question of systems is dwindling in importance, as it has been amply demonstrated that any one of the electric systems used for the purpose can be made to give satisfaction. Any

one of them has advantages over steam for most conditions. Especially in a mountainous country like Switzerland, with heavy grades and ample water-power, there can be little excuse for postponement of the adoption of electric operation.

Countries like Norway and Sweden, whose physical characteristics resemble those of Switzerland, are already planning electric operation upon a large scale. Further developments of this kind in the mountainous regions of America should be no longer delayed.

MUNICIPAL OPERATION OF UTILITIES.

The paper which was presented by Prof. A. G. Christie at the midwinter convention of the American Institute of Electrical Engineers showed that it is possible to obtain satisfactory operation of public utilities which are municipally owned and operated. The cities dealt with in this paper are located in Western Canada, and a few equally creditable instances can be found in this country, but they are indeed few. It is of interest to compare conditions in the cities of the two countries, and to note why in the one, municipal operation is generally satisfactory whereas in the other it has been generally unsatisfactory.

In the first place there are some geographical considerations. In a new country of large opportunities there is less scramble for public office and hence less motive for political interference. The tax system of Western Canada is conducive to a continuation of these opportunities. There is also a better spirit among the citizens of co-operation for the general good, engendered by the necessity of meeting common problems and having few elements of competition among themselves.

As the plants are nearly all of recent date, the equipment is modern and efficient. Continuity in management has been the rule, with responsibility and authority centralized. The cost of generating power varies greatly with the availability of fuel, and prices for electric lighting show a wide range, but generally make a favorable comparison with cities in this country. Professor Christie points out that the principal effect of low rates has been to increase land values in the districts served. Depreciation and amortization of indebtedness have not always been properly cared for, and may make difficulties in the future, a situation which also exists in many privately owned corporations. Efficient management by competent executives predominates. Service has usually been good, but sometimes has suffered from the need of council approval for the purchase of new equipment. Accounting as a rule is carefully done, and utility finances kept separate from other accounts.

Turning to the conditions usually prevalent in this country, we find a great contrast. Accounting is usually such that it is not easy to ferret out the real condition since the accounts of the utility department are not completely segregated from other municipal departments. Efficient management is the exception, as there is usually no continuity in personnel, insufficient authority lodged in the executive, political interference with policies, purchases and payroll, and more or less application of the spoils system. Neglect of depreciation and provision for renewals is common, with likelihood of obsolete equipment continuing in service. Extensions usually require additional bond issues, which the voters may decline to approve, and in any case cannot be carried out without the sanction of the city council, which is often influenced by political considerations. Whether the growth of the commission form of government and the city manager plan will alter the conditions now usually prevalent, remains to be seen. Two great advantages from the economic standpoint accrue to municipal ownership: the possibility of lower fixed charges arising from a lesser rate of interest on securities, and from the absence of any element of intangible value in the capitalization. This is limited to the actual costs of creating the physical plant and the business.

Aside from charges for service, one of the principal reasons given for municipal ownership has been the participation in politics of those controlling privately owned plants. In certain cities this has been an undoubted evil, although often officials have found no other course open to them under the corrupt conditions already prevailing. Happily this state of things is disappearing, and with it this objection to private ownership of utilities. Regulation of utilities by state commissions is looked to by some to remove all objections to private ownership. Others claim that regulation has failed and public ownership is the only recourse. These should remember that public operation itself involves public regulation. Failure of government regulation connotes the failure of government ownership. The success of government regulation makes government operation unnecessary.

In conclusion it may be well to mention here the principles which Professor Christie would apply to municipally owned utilities. They should be self-supporting and subject to taxation; they should be financed by serial bonds, including extensions. Depreciation and emergency reserve funds should be set aside, and any surplus rebated to customers. The superintendent should hold office during good behavior and have a free hand to develop the utility without political interference. A public utility commission should supervise the finance, accounting, rates and administration of municipal as well as privately owned utilities. These are all good points, and if they could be generally adhered to, we should hear less of failures of municipal projects. But there seems to be no place in this country where all of these principles have been applied, and in many places all of them are lacking. To start a municipal plant without first preparing the soil is to invite disaster.

Happenings in the Industry

Illinois Electric Association Discusses Electric Cooking—Exports Show Increase—Contractors Plan Important Convention in New York—Street Lighting Discussed in Chicago—Program for Boston Central-Station Convention—Texas City to Test Value of a Franchise—Important Hearing on Yosemite Power Case—Miscellaneous News Notes

ELECTRIC COOKING AS A LOAD BUILDER.

Discussion at Convention of Illinois State Electric Association Indicates Electric Cooking a Vital Question to Central Stations.

That the electric cooking load offers practically the only hope of materially increasing the earnings in towns where electric power load is not available was the prevailing thought expressed in a discussion of electric cooking by the Illinois State Electric Association in convention at Champaign, Ill., February 24 and 25. The importance of this class of business was brought forcibly to the attention of the Association in a paper by J. Hall Clayton of Mattoon, Ill., presented at the session on Thursday morning.

Mr. Clayton pointed out that there are about 625 towns in Illinois receiving electric service and of these only 225 are supplied with gas, leaving 400 towns where electric cooking can be successfully developed with electric rates low enough to make this form of cooking an economic success. It is estimated that in Illinois there are 80,000 residence customers now using electric light who have no gas available and who are therefore prospects for electric cooking. When it is considered that the average annual income from an electric range customer amounts to about $36 it is apparent that the total income from electric cooking, if every residence customer would be supplied, would amount to $2,880,000 per year.

The average energy requirements for electric cooking amount to about 100 kilowatt-hours per month. The company serving Mattoon has kept records of the monthly energy consumption of 150 cooking customers divided among 50 towns. The average consumption per customer by month for the last six months of 1915 was as follows:

	Kilowatt-hours
July	99.8
August	89.8
September	93.3
October	108.0
November	101.6
December	106.1

Mr. Clayton points out that in order to develop cooking to any large extent in Illinois, it is necessary to offer rates of from 3 cents to 4 cents per kilowatt-hour for residence cooking and less than 3 cents per kilowatt-hour for restaurants, hotels and other cooking customers using large amounts of energy.

The experience of the Mattoon company indicates that the average residence customer's demand is for a range costing from $35 to $50. In order to lessen the objection to the high initial cost of ranges, it is very essential that they be sold on deferred payments in the same way that gas ranges are generally sold. The initial price of the range should preferably include the cost of wiring necessary to connect up the range.

Cost of Serving Electric Ranges.

When the Central Illinois Public Service Company first started selling electric ranges, a very accurate record was kept of all expenditure necessary to serve each range. The total cost per range of connecting 30 ranges in 15 different towns was as follows:

Line extension (primaries and secondaries)	$5.26
Service drops	3.29
Transformers	6.12
Meters	7.91
Total additional expenditure per customer	$21.58

These figures are based on the prices of copper obtaining about a year ago. In connecting the above 30 customers it was necessary to increase the transformer capacity in only eight cases. The remaining 22 customers were served from the transformers already serving lighting customers in the immediate vicinity.

In order to make cooking by electricity successful, it is very necessary that the service to each range be carefully planned so that there is full voltage at the range. In one case the voltage on a group of ranges fell about 10 per cent below normal and the consumption of the ranges was very much increased from this cause, resulting in dissatisfaction from high bills.

The company at first found it very difficult to interest prospects in electric ranges and had to adopt the plan of installing them for a trial period 30 days. At least 90 per cent of the ranges so placed were subsequently sold. Efforts are made to introduce electric cooking in domestic science schools and at every opportunity an electric range is loaned to women's clubs, church societies, etc.

Mr. Clayton points out that the average residence customer pays about $18 per year for his lighting service, while the average range customer pays about $36 per year.

The paper was discussed rather fully, the consensus of opinion being that the electric-range business could be considered as off-peak and consequently a low rate could be offered. In regard to the attitude of the Public Service Commission relative to a three-cent or four-cent cooking rate where higher lighting and power rates are maintained, it was pointed out that the commission already recognizes class rates and central stations can justify a low cooking rate.

J. P. Ingle, of Keokuk, thought there would be some difficulty in justifying a three-cent cooking rate to customers who are paying a higher power or lighting rate and using service at the same time the range is in operation. He urged that instead of figuring on what rate it is possible to obtain cooking business, central stations had better figure on what rate energy can be sold for cooking purposes and a reasonable profit made.

K. A. Steinhauser, of Nashville, explained that electric cooking is entirely offpeak in his territory and therefore justifies a low rate. A three-cent rate is made for electric cooking and also for water heaters as the practice in Nashville has been to use electric ranges only during the months when heat was not required in the kitchen.

J. G. Learned, of Chicago, V. V. Parshall, of Pontiac, W. F. Corl, of Hillsboro, and Charles B. Yonts, of Dixon, also discussed this paper.

First Convention in Two Years.

That a lively interest is taken in association affairs, after a lapse of more than two years since the last meeting, was evident from an attendance of over 150 at the opening session of the convention. The meetings were held in the lecture room of the Physics Building at the University of Illinois, Urbana, and all were well attended. The headquarters were at the Hotel Beardsley.

In the absence of President James, of the University, David Kinley, vice-president, delivered the address of welcome in which he spoke of the relationship between the University and the electrical industry of Illinois. "The former," he said, "aims to keep in touch with the advancement in science, but also endeavors to contribute its share to scientific development." S. E.

McDonald, of Hillsboro, president of the association, in his address called attention to the fact that since the last meeting, the Public Service Commission of Illinois has been established. He expressed the opinion that commission regulation will prove beneficial to the industry, but so far the tendency has been to curb development.

Boiler-Room Efficiency.

At the first session a paper entitled, "Some Aspects of Boiler Efficiency," was presented by H. J. Clotz, of Decatur, Ill., in which some of the economies that can be effected in steam electric plants were pointed out.

The discussion which was participated in by E. H. Negley, of Canton; H. E. Brandlie, of Mount Vernon; W. F. Corl, of Hillsboro; E. B. Carr, E. B. Paine, H. J. Pepper, of Champaign; R. S. Wallace, of Peoria, and E. D. Higgins, P. B. Juhnke, of Chicago, took the form of an experience meeting in which various boiler-room practices were enumerated.

Voltage Regulation.

At the session on Thursday morning, a paper entitled "Voltage Regulation of Distribution Circuits," was presented by E. B. Paine, of the University of Illinois. Professor Paine outlined the fundamental factors which influence voltage regulation and by means of stereopticon views illustrated various equipment that may be used to correct poor regulation.

The paper was discussed by Messrs. Owen, of Peoria; Galta, of Sparta; Theodore Blech, of Waukegan; E. B. Hillman, of Wyoming, and Prof. Morgan Brooks, of Urbana.

A paper entitled, "Are Steam Heating Plants Profitable?" by H. R. Wetherell, of Peoria, was presented in the absence of the author by J. A. Strachan, at the session Thursday afternoon. This paper considers communities of 10,000 population or less and discusses the following questions as being pertinent to the success of steam heating:

(1) Can a company afford to employ a man who has made a specialty of district heating to take charge of the department as superintendent?

(2) What kind of a rate can you secure?

(3) How much territory does your franchise require you to cover?

(4) What is the condition of the soil in the proposed heating district?

(5) In what condition is the sewerage system?

(6) What is the nature of the daily electric load and is the plant equipped with condensing or non-condensing electric units?

(7) What are the prices of fuel where your plant is located?

The paper was discussed by H. J. Pepper, of Champaign; Messrs. Marks, of Chicago; Hamilton, of Mattoon, and Brooks, of Urbana.

Rates.

The paper entitled "Rate Schedule for Towns of 2,500 or Less" was presented by Morgan Brooks, of the University of Illinois, at the closing session on Thursday afternoon. Professor Brooks discusses various phases of rate-making as applied to small utilities and proposes the following schedule:

(1) A fixed charge for every consumer of 40 cents, plus 20 cents for every 1,000 square feet of floor area in active use. This becomes a minimum charge when no current is used.

(2) A variable charge dependent on the meter reading, on the block scale, of 8 cents for the first 50 kilowatt-hours, followed by five cents for the next 450 kilowatt-hours and that followed by three cents for all above 500 kilowatt-hours.

(3) A discount of 10 per cent to be allowed for prompt payment.

The paper was discussed rather fully by J. G. Learned, of Chicago; P. B. Juhnke, of Chicago; W. F. Corl, of Hillsboro; H. J. Pepper, of Champaign; Merton James, of Chicago; Charles B. Yontz, of Dixon, and others.

R. S. Wallace, of Peoria, was elected president, H. O. Channon, of Quincy, vice-president and R. H. Abbott, of Petersburg, secretary-treasurer.

Electrical Exports for December and the Year 1915.

From the monthly summary of the foreign commerce of the United States for last December, just issued by the Bureau of Foreign and Domestic Commerce, it is evident that the electrical exports of that month totaled close to the average throughout the year, although much below the record total of November. For the four electrical classes for which the numbers of articles exported are given in the government report there were shipped last December the following: Electric fans, 1,340; arc lamps, 186; carbon-filament lamps, 208,901; metal-filament lamps, 674,913.

The detailed figures for last December and for the corresponding month of 1914 are as follows:

Articles.	Dec., 1915.	Dec., 1914.
Batteries	$ 110,164	$ 58,947
Dynamos or generators	116,383	262,325
Fans	20,308	13,784
Insulated wire and cable	174,886	92,146
Interior wiring supplies, etc. (including fixtures)	76,967	54,836
Lamps—		
Arc	3,392	742
Carbon-filament	23,945	3,962
Metal-filament	120,998	64,058
Meters and other measuring instruments	68,463	21,200
Motors	233,250	271,192
Telegraph instruments (including wireless apparatus)	14,201	2,118
Telephones	87,722	113,627
Transformers	50,477	62,097
All other	1,076,182	599,529
Total	$2,177,338	$1,620,563

In the following table are given the monthly totals for the electrical exports during 1915 and 1914:

Month.	Electrical Exports. 1915.	1914.
January	$1,773,938	$1,947,646
February	1,683,567	1,930,513
March	1,661,671	2,104,332
April	2,055,375	1,741,551
May	1,802,209	2,040,720
June	2,047,081	1,450,437
July	2,147,307	1,415,360
August	1,806,292	1,024,010
September	2,263,291	1,548,468
October	2,145,594	1,494,792
November	2,774,847	1,644,723
December	2,177,338	1,620,563

The totals for the last three years are given in the following table:

Year.	Electrical Exports.
1913	$28,197,363
1914	19,963,115
1915	24,308,510

New Water Power Association Formed.

Offices were opened in Washington, D. C., on February 28, by a new national association, which will launch a campaign of publicity designed to aid the administration in securing the passage of laws to encourage the development of water powers in the public domain and the navigable streams. The new organization, which calls itself the Waterpower Development Association, is composed of manufacturers of water wheels, hydraulic and electrical machinery, equipment and supplies, whose business has been seriously injured by the stagnation in hydroelectric construction work in the last few years, and who look forward to a revival of the industry and an increased business when the general dam act and the leasing bill for the power sites in the public domain, supported by the President and by Cabinet officers, are enacted into law.

In a statement issued by Marcus A. Beeman, secretary of the association, concerning its aims and purposes, it is asserted that the country has been greatly misinformed concerning the facts about the water-power industry and the legislative situation, and the new organization proposes to carry on a campaign of publicity which will present the facts.

"The purpose of the Waterpower Development Association," says Mr. Beeman, in his statement, "is to tell the truth about water powers and the water-power business.

We intend to tell the American people the facts that have been kept from them as to why our water powers are allowed to flow to waste, while we burn coal at high prices to generate power. We propose to expose the crime that has been committed in locking these natural resources from use and keeping them locked from use, and the benefits that will accrue to the whole nation from development and use, as well as to make plain what kind of legislation is necessary to induce investment in water-power development.

"There seems to be a unanimity of opinion that legislation of some kind is needed. The President of the United States, Secretary of the Interior Franklin K. Lane, former Secretary of War Lindley M. Garrison, the Public Lands Committees and the Committees on Commerce of both the Senate and House, have all recommended legislation. The House of Representatives has passed bills to permit use of power sites, in both the public domain and the navigable streams. There are some differences of opinion as to the details of this proposed legislation, but we believe that all the persons named are disinterested and sincere in their recommendations, and that these differences of opinion are not vital.

"Our association is not committed to any particular bill or any particular plan or program of legislation. It desires only such legislation as will bring development and use of the water powers, and which will fully protect both the interests of the public and of investors in these enterprises."

The affairs of the Waterpower Development Association are in the hands of a committee made up of Harry W. Hand, vice-president of the I. P. Morris Company, Philadelphia, water-wheel builders; W. W. Nichols, of the Allis-Chalmers Manufacturing Company, Milwaukee, makers of water wheels and electrical apparatus; Chester W. Larner, of the Wellman-Seaver-Morgan Company, Cleveland, water-wheel manufacturers; J. E. Way, of R. Thomas & Sons Company, East Liverpool, Ohio, insulator manufacturers, and Calvert W. Townley, of the Westinghouse Electric & Manufacturing Company, Pittsburgh, manufacturers of electrical apparatus and supplies. Marcus A. Beeman, secretary of the association, has been assistant secretary of the Cleveland and the Buffalo Chambers of Commerce, and secretary of the New Jersey State Chamber of Commerce.

Plans for National Electrical Contractors' Convention.

Tentative plans for the sixteenth annual convention of the National Electrical Contractors' Association have been completed and it is the belief that the forthcoming meeting will be the most successful in the history of the organization.

Headquarters will be at the Hotel McAlpin, New York, N. Y., and all sessions will be held there. Following is a resume of the program:

Monday, July 17—10 a. m., meeting of the National Executive Committee.

Tuesday, July 18—10 a. m., meeting of National Board of Directors.

Wednesday, July 19—10 a. m., opening of convention. Session open to all. Speakers: Address of Welcome, Lewis H. Woods, president New York State Association; address by John R. Galloway, president the National Electrical Contractors' Association; address by Hon. John Purroy Mitchel, mayor of New York City; James H. McGraw, president of the McGraw Publishing Company, subject, "The Society for Electrical Development and Its Relation to Merchandising"; T. Commerford Martin, secretary National Electric Light Association; Arthur Williams, New York Edison Company; 2 p. m., business session, open to members only; 9 p. m., reception and dance in the blue and green room, Hotel McAlpin.

Thursday, July 20—10 a. m., business session, open to all in the electrical contracting business, whether members or not; 10:30 a. m., ladies to visit one or more department stores for parade of gowns, etc.; 2 p. m., business session for members only; 2:30 p. m., for ladies and guests, exhibition of Aeolian and new talking machine at Aeolian Hall; 7 p. m., automobile rides to Coney Island.

Friday, July 21—10 a. m., business session for members only; 3 p. m., special train on Long Island road, leaving Pennsylvania Station, to Hotel Trouville, Long Beach; 4 to 6:30 p. m., surf bathing, etc., at Long Beach; 6:30 p. m., dinner-dance and entertainment.

Saturday, July 22—9 a. m., organization meeting of the National Board of Directors; 10 a. m., organization meeting of the National Executive Committee; 11 a. m., leave hotel for special boat, "Seeing New York by Water," a complete circle of the city will be made and light lunch served on board, landing about 4 o'clock.

Open Session for Non-Member Contractors.

With a view of interesting electrical contractors who are not members of the National Electrical Contractors' Association the Executive Committee has decided to invite all electrical contractors to attend the morning business session on Thursday, July 20, at which time two very interesting subjects will be brought forward.

First—The report of Joseph A. Fowler of Memphis, Tenn., chairman of Insurance Committee on the National Plans for Joint Liability and Compensation Insurance, whereby a large saving in insurance premiums is effected for members. His report will be supplemented by an address by L. T. Block, manager of the Utilities Indemnity Exchange, of St. Louis.

Second—The report of E. McCleary of Detroit, chairman of the National Code Committee, who will give much valuable data on this interesting subject and who will give or designate someone to give the latest data regarding the much discussed "Concentric Wiring." Discussions on these subjects will take place, in which members and non-member contractors will be expected to join.

Symposium on Street Lighting.

A joint meeting was held in Chicago on the evening of February 28, by the Chicago Sections of the American Institute of Electrical Engineers and Illuminating Engineering Society, and the Electrical Section of the Western Society of Engineers. Three papers on street lighting were presented, the first one by J. R. Cravath, on the subject "Recent Street-Lighting Problems and Developments." This paper reviewed the improvements in illuminants and showed that the gas-filled tungsten lamp and the luminous arc lamp with the recently perfected high-efficiency electrodes are the best units in modern electric practice. Referring to the rating of lamps in street-lighting contracts, Mr. Cravath called attention to the numerous controversies caused by the old rating of series carbon open arcs as 2,000-candlepower lamps. Lamps should nowadays be rated in terms of total lumens emitted, by mean spherical candlepower and a statement of the angle to which the maximum flux is radiated. The horizontal rating of incandescent lamps, though still largely used, is not very reliable. Better discernment is obtained by a large number of small lamps than by a small number of larger lamps. On account of the limited appropriations usually available, residence streets cannot be laid out with a very large number of lamps, however. Therefore, it is desirable to use auxiliary reflectors or refractors to increase the illumination between the lamps. The street-lighting contract should provide for checks on the actual street performance of lamps as compared with laboratory tests. Depreciation in service is quite serious

and must be watched to secure proper maintenance. Flexibility in a street-lighting contract is desirable; a plan meeting with considerable favor now is for the city to buy its energy on the kilowatt-hour basis and to own its lamps and circuits, thus permitting change in the latter without affecting the contract. Various criteria have been considered in street illumination. Probably the best is the minimum vertical illumination between lamps in the case of residence streets and minimum horizontal illumination in business streets. Avoidance of glare is a very important consideration; this is receiving recognition as is shown in the fact that mounting heights of street lamps of 16 to 25 or even 30 feet are now becoming common, as compared with 10 to 14 feet formerly in vogue.

A. C. King then read a paper entitled "Some Experiences and Tests in Connection With Chicago Street Lighting." He referred to the first extensive use of flame arc lamps of the series alternating-current type, which was made in Chicago about the year 1912; in 1914 the city also made the first extensive use of gas-filled tungsten lamps for street lighting. Although the flame arcs are more efficient in laboratory tests than the gas-filled incandescents, it has been found that their average performance in service does not yield even approximately the results anticipated. The absorption of light by the globe averages about 40 per cent in these units. Experience in Chicago has shown that the 300-watt gas-filled, or type C, lamps give as much light in service as the 465-watt flame arcs; the power-factor of the circuit in which they are used is also raised from 82 (in the case of flame arcs) to 98 per cent. Both these facts now permit placing 100 type C lamps on a circuit in place of 65 flame arcs, and this without any change in the equipment in the substation. The guaranteed 1,000-hour life of the gas-filled lamps has been considerably exceeded, some lamps running up to 4,300 hours. On January 1, 1916, the city had in use 12,275 of the type C 300-watt lamps; in a few months this figure will have been increased to nearly 16,000. In order to get the best results from these lamps, close regulation of the circuits is necessary. Prismatic refractors that were tried out on these lamps in order to improve the character of distribution have been found objectionable in many residence districts because too much light was thrown into the upper stories of houses, thus making it necessary in many cases to put shades on the building side of the lamps. The city also has in use nearly 8,000 80-watt type C lamps giving 100 candlepower on series circuits in residence districts where many trees are met with. Reports of lamp outages for these three types of lamps average as follows: Flame arcs, 1.95 per cent; 600-candlepower type C lamps, 0.76; 100-candlepower type C lamps, 0.39.

F. A. Vaughn then gave an illustrated talk on "Street-Lighting Plans of Milwaukee." He briefly reviewed the survey of street lighting which had been made last summer and explained the plans which had been drawn up for the complete rehabilitation of the street-lighting equipment. About one square mile of the city has been equipped with the new system during the present winter. Three types of posts have been selected, having respective heights of 15, 22.5 and 30 feet; the first are used in residence districts and boulevards where trees are plentiful; the second on secondary business streets; and the third on the principal business streets. The posts are all made of concrete by a special process. All the electric lamps used are of the gas-filled tungsten type. In the case of the 15-foot posts, a type of inverted-mantle gas unit has been developed that is nearly equivalent to the 1,000-lumen type C lamp; in external appearance it resembles closely the electric unit. At street intersections, and also in the case of some streets that are undergoing transition, lamps are suspended over the middle of the street. They are cleaned by means of a tower wagon with collapsing platform. This permanent mounting does away with the loose wires formerly common in similar suspended lamps. At the municipal election next April extension of the system throughout the entire city will be voted on.

In the general discussion there participated Ward Harrison, C. H. Shaw, L. Friedmann, D. W. Roper, P. Junkersfeld and Mr. Vaughn. Mr. Harrison described briefly the new type of white-way lighting being installed in Cleveland in which lanterns of special design are used. Mr. Shaw spoke ot the excellent performance obtained from 600-candlepower type C lamps in Sheboygan, which have been in use about one and one-half years. They are placed at street intersections and mounted 25 feet above street surface. The results obtained have been so satisfactory that the city has extended the system and in the near future probably will practically double it.

Kansas City Jovians Hear Speech on Valuation of Utilities.

The Jovian Electric Club, of Kansas City, Mo., held a luncheon February 25, at which the attendance was the highest yet recorded, 124 being present. The chief speaker was F. S. Lyman, senior telegraph and telephone engineer of the Interstate Commerce Commission, in charge of valuation in the district between the Mississippi River and Utah. Mr. Lyman told of the purposes and probable results of the inspection, and of the methods used. He said that an important result probably would be the demonstration that many utilities would be shown to be worth more than their stocks and bonds, and that investors would, therefore, be encouraged to put money into them, to the great advantage of the utilities and the public served by them. Considerable data are being collected on the effects of various influences, such as rainfall and soil, on poles and wire. One of the interesting disclosures of the inspection is that iron wire has a life of at least 60 years under certain conditions. He referred to the Western Union wire between St. Louis and Washington, installed in 1856, and still sound.

The second of a series of four rejuvenations at Kansas City was conducted at Shrine Hall, February 24. The candidates numbered 28. A luncheon was served after the ceremonies, P. Lloyd Lewis, statesman for Missouri, acting as toastmaster. Ell C. Bennett, Mercury of the Order, talked on the purposes and opportunities of Jovianism. L. E. Reed, Tribune of the Order at St. Joseph, and J. E. French, Tribune at Salina, also spoke.

Program of Boston Convention, March 7 and 8.

Sessions of the Spring Question Box Convention of the New England Section, N. E. L. A., will be given to the following subjects: Tuesday, March 7, forenoon, New Lighting Business: Commercial Campaigns, Residential, House Wiring Plans, Concentric Wiring, Mazda C Lamps; afternoon: New Power Business: Your Share of Prosperity, Small Customers, On the Farm, Large Contracts, Diversity Factor; also, Electric Vehicles and Electric Ranges.

An informal dinner will be held in the evening, at the convention meeting place, the American House, Boston, and on Wednesday the subjects will be Production and Distribution and Accounting. The subject of Production is divided into Combining Plant Capacities, Reaching Outlying Territory, Duplication of Lines, Joint Maintenance Construction, Voltage Regulation, Street Lighting in Outlying Districts, Underground Construction Methods, Electrolysis, Fusing of Transformers, and Maintenance and Inspection. Standard Classification will also be considered.

Missouri Public Utilities Association to Hold Convention-Cruise.

At a meeting of the Executive Committee of the Missouri Public Utilities Association, held recently in Kansas City, it was decided that the next annual convention of the association should again be held on board boat. The start will be made from St. Louis on May 11, and after passing the scenic bluffs of the Mississippi River, the boat will enter the Illinois River, arriving at Peoria on the second day. A sight-seeing trip will be held at Peoria, and the return to St. Louis will be made on May 12, arriving at St. Louis at 2 p. m., Saturday, May 13.

A very interesting program of papers and entertainment is being arranged, and all indications point to a very successful convention. The fare for round trip, including meals and berth, will be $15. F. D. Beardslee, of the Union Electric Light & Power Company, St. Louis, is secretary of the association.

Canvass Shows Highway Lighting Neglected.

The lighting of public highways, other than streets, in municipalities by townships, counties or states, has been sadly neglected in all parts of the country. In fact, it is doubtful whether there are any highways in the United States which are illuminated at the expense of the state or county. In gathering data for the report of the Committee on Municipal and Highway Lighting, of the Lighting Sales Bureau, N. E. L. A., the secretary of each state in the Union was consulted for information regarding highway illumination which is paid for by the state or by counties. About 90 per cent of the states in the Union were heard from to the effect that no moneys were ever expended for this purpose or that the subject had never been given consideration.

The rapid increase of traffic during the night, for which the automobile is largely responsible, calls for the safeguarding of public highways by illumination, and it is expected that the committee of which Thomas F. Kelly, of the Dayton Power & Light Company, Dayton, Ohio, is chairman, will incorporate in its report some ways and means for bringing about a movement for interesting state governments in the safeguarding of at least the principal highways by illumination.

Texas Case to Test Value of a Franchise.

Recommendations for a solution of the traction and electric lighting situations in Dallas, Tex., filed with the Board of City Commissioners on February 19 by E. W. Bemis, were adopted by the Board and formally rejected by Stone & Webster, owners of the properties.

Following the rejection of the "model franchise" proposed as a result of the investigations conducted, it was announced by the city administration that a charter amendment embodying the adoption of the franchise would be submitted to a vote of the people at the city election April 4 and that the city would seek to condemn the present Stone & Webster franchise if the company does not change its mind and adopt the franchise offered. In case the company does not adopt this franchise, it will be offered to any corporation that cares to enter the field.

The franchise proposed embodied the following ideas:

The street railway east of the river should be capitalized at $3,500,000 upon which the company would be allowed to earn a maximum of 6 per cent, net per annum.

The electric lighting property should be capitalized at $3,500,000 upon which the company would be allowed to earn 7 per cent net per annum.

Electric light rates should be reduced to a figure not determined definitely, but which would not be more than 8 cents per kilowatt-hour as against 10 cents per kilowatt-hour as at present.

A sliding scale for reduction of street-car fares, as profits increased would be adopted.

All revenues above operating expenses and allowed net earnings should be devoted to reduction in fares and light rates.

Complete rehabilitation of the rolling stock of existing street-car lines and of electric light plant and wide extensions of service of both.

The franchise to be determinate for ten years only. After that period the city either would have the right to take over for itself or some corporation offering better terms both the street railway and lighting systems, upon payment of a stipulated sum.

Appointment of a public supervisor to represent both the interests of the investors in the properties and of the citizens of Dallas, the supervisor to have jurisdiction in ordering improvement of service and equipment.

Arbitration of differences between the public utilities company and the city.

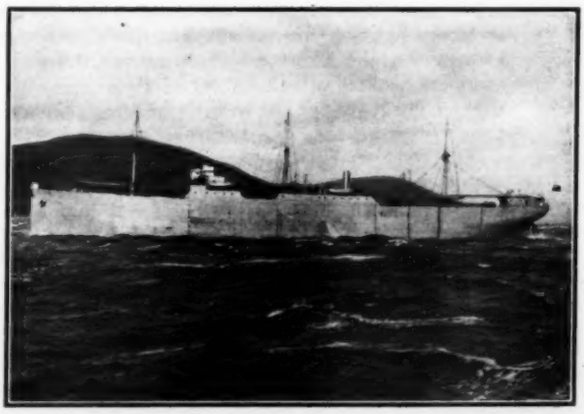
The entire proposition was rejected by Stone & Webster on the ground that the capitalization and rate of income proposed are both too low. They claim a valuation of $5,000,000 each on the traction lines east of the river and the light plant, and want 8 per cent upon this capitalization.

If the charter amendment proposed is passed at the April election, the matter will no doubt be taken to the courts and the proceedings will be watched with interest.

The main point seems to lie in the power of the city to condemn the present franchises of the company which yet have a long period to run. If this point is decided by the courts in favor of city it will set a precedent which will make it hard to finance any kind of a public utility investment in Texas, as franchises will not be worth anything at all and will be no guaranty of certain points under which a corporation may operate.

New Motor-Driven Steamship Makes Its First Trip Across the Atlantic.

A steamship without boilers and lacking the usual smokestack, is the twin-screw freight and passenger motor ship *Bostonian*, which recently entered Boston on its maiden trip from Liverpool. This novel craft, which is the pioneer in transatlantic service, was built in Belfast, Ireland, and is equipped with Diesel oil engines and electric motors which operate all working arrangements of the ship, including all deck machinery, steering gear and windlasses. Besides having large cargo capacity, the *Bostonian* has accommodations for a number of passengers, being constructed under the British Board of Trade passenger certificate survey.



Motor Driven Steamship on Its Maiden Voyage.

Important Hearing on Yosemite Power Case.

At special hearings on January 26, 27 and 28, at Washington, D. C., Secretary Lane heard legal arguments on the application of the Yosemite Power Company for permission to make hydroelectric developments on the Main Tuolomne River, in the Yosemite National Park. This application of the Yosemite company, or that of its predecessors in interest, has been pending before the Department of the Interior for several years. Action by the Department has been deferred due to objections by certain irrigation districts further down the river, and by the City and County of San Francisco, which also has rights on the same river within the Park.

The application of the Yosemite Power Company specifically is for the right to erect a dam and maintain a reservoir in the Poopenaut Valley, which lies immediately below the Hetch Hetchy Valley. By special act of Congress, passed December 19, 1913, the City and County of San Francisco were granted the right to construct a dam and flood Hetch Hetchy Valley and impound waters therein for the purpose of making certain hydroelectric developments and supplying the City of San Francisco and the adjoining districts with water for municipal purposes. Under the terms of the grant by Congress, San Francisco is compelled to release certain amounts of water from the Hetch Hetchy reservoir for the benefit of the Modesto and Turlock Irrigation Districts, and the city objects to any department of the Government granting permits for other corporations or individuals to make developments along the main Tuolomne between the Hetch Hetchy Dam and a point 12 miles further down stream, known as "Early Intake," where the water in the stream will first be diverted into the aqueduct to be constructed by the city. The grounds for protest are that regulation of the flow by the city would be interfered with and, moreover, the building of a dam, aqueduct lines and power house by other interests would cause physical conflict with the structures to be erected by the city. The irrigation districts object to the granting of any application to the power company on the ground that they have prior rights to the use of water in the river, although they admit their objection is largely technical and they would probably be benefited by the creation of additional dams and reservoirs on the water-shed above them. The Yosemite Power Company claims to own water rights prior to rights granted by Congress to the City of San Francisco, and as the act of Congress specifically provided that nothing in the act should "be construed as affecting or intending to affect or in any way to interfere with the laws of the State of California relating to the control, appropriation, use or distribution of water used in irrigation or for municipal or other uses, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this act, shall proceed in conformity with the laws of said State," the attorneys for the power company argue that, under the State laws of California, pursuant to which the company made its water filings in the Poopenaut Valley, the Secretary of the Interior is in effect compelled to recognize the prior rights of the power company as derived under the State laws, and issue a permit for the proposed development. The company's representatives further call attention to Section 3 of the Act of Congress, which says "that the rights-of-way hereby granted shall not be effective over any lands upon which homesteads, mining or other exiting valid claim or claims shall have been filed or made, and which now in law constitute prior rights to any claim of the grantee until said grantee shall have purchased such portion or portions of such homestead, mining or other existing valid claims as it may require * * *."

As the Yosemite Power Company, early last year, continued to urge the granting of its application by the Department of the Interior, the latter employed Henry Floy, consulting engineer of New York City, to go to California, examine the physical conditions on the ground, and report particularly with regard to the engineering questions involved, and possible interference in the construction plans proposed by the different parties interested. Mr. Floy twice visited California last year and spent considerable time ascertaining the various engineering features involved, and while there in November held a public hearing at which the officials, engineers and attorneys of the various parties interested appeared and presented evidence, testimony and argument, particularly along engineering lines. Upon submission of Mr. Floy's report, Secretary Lane appointed January 24 at which time he agreed to hear the legal arguments of the respective parties as to their rights in the case, and objections as to why the application of the power company should not be granted. This hearing was continued for three days, and at its conclusion Secretary Lane took the whole matter under advisement for further consideration, but it is expected he will hand down his decision some time during the present month.

Outline of Industrial and Yard Lighting Committee Reports.

The Committee on Industrial and Yard Lighting, Lighting Sales Bureau, Commercial Section N. E. L. A., has announced through Oliver R. Hogue, secretary of Lighting Sales Bureau, and chairman of the committee, the outline of its divisions of the Lighting Sales Bureau's report at the 1916 convention. The outline was prepared by Mr. Hogue with the assistance of members of his committee.

The part of the report devoted to industrial lighting will consist of eight sections, as follows: (1) Preface. (2) Methods used to obtain industrial load. (3) Designs of industrial lighting systems. (4) Data on typical installations. (5) Arguments for good lighting. (6) Load-factors. (7) Maintenance. (8) Color value.

The purpose of the paper will be outlined in the preface. The second section will be a comprehensive, detailed discussion of methods used by central stations to obtain industrial lighting loads. Section 3 will present various lighting systems and equipments in use in the industrial field. Section 4 will be a view of installations for typical plants of 30 industries. Section 5 will give many arguments in favor of good lighting, of value to the lighting salesmen. Section 6 will be a presentation of load-factors, giving tables and a general discussion. The reasons for maintenance of lighting systems in industrial plants, data on cost and saving, as well as other data, will be given in section 7. In section 8 the color values of various units, their uses and results obtained will be presented.

The part of the report devoted to yard lighting will discuss the purpose of the invention of such lighting, the field covered, methods used, and existing installations.

An appendix to the committee's report will present policies in the United States and abroad, in regard to the lighting code.

The report of the committee is being prepared with the thought of presenting data and suggestions of practical value to those interested in the subject.

Protest Against Washington Power Plant.

The council of the American Institute of Consulting Engineers has adopted a resolution protesting against the proposed new government power plant, to be erected on the Potomac River at Washington, D. C. Many other protests have been made by others, the principal objection being that the site chosen interferes with the plan for beautifying the city, and was not approved by the Art Commission.

Miscellaneous NEWS NOTES

Private Contracts Are Private.—Private contracts made by power companies cannot be investigated by the Public Service Commission, according to a decision of the Supreme Court in the case of the Washington Commission against the Spokane & Inland Empire Railway Company.

Illuminated Traffic Regulator.—A new type of traffic regulator, known as the "Dinox," with interior lighting arrangement which permits of night as well as day operation, as the name implies, has been invented by a Boston man and installed on trial at two important street intersections in Boston. The lantern, on which are the signs "Go" and "Stop," is illuminated by two 40-watt Mazda lamps installed within.

Improved Type of Radiogram Receiver.—A type of radiogram receiver that does away with ear pieces has been invented in Spain. It is stated that the radius of operation of the new apparatus is in excess of 3,100 miles and that it is contemplated to institute radiographic service between Spain and the United States. Details of the new instrument are not yet available.

Successful Jovian Rejuvenation in Columbus.—The new Elks Home was the scene of the Columbus Jovians' annual rejuvenation, on the evening of February 18. There were 55 initiates, and 206 people sat down at the banquet which followed the initiatory ceremonies. A feature of the event was the perfection with which the team performed its part. The Columbus district now has a registration of over 300 members.

Signs Must Be Lighted in Joplin.—An ordinance recently adopted by the city commissioners at Joplin, Mo., provides that signs shall protrude no more than 2 feet from the property line, and illuminated signs shall be lighted between 5 and 10 o'clock every evening. Cloth signs are prohibited. The ordinance affects about 80 electrical signs, and nearly as many signs without illumination. There is agitation to make 7 o'clock the time for lighting up in the summer months.

Safety-First Exposition.—Twenty-six bureaus of the government service participated in a Safety-First Exposition in Washington, D. C., February 21-26. Various means for protection from electrical hazards were exhibited by the Bureau of Standards. Among the specific lines represented were: Hazards due to falling overhead wires, building failures by electrolysis, National Electrical Safety Code, direction indicator for wireless fog signals, and a form of decremeter to prevent the interference of wireless signals.

New Machinery Hall in New York City.—Machinery manufacturers are to be aided in trade expansion by the establishment of permanent machinery exhibition rooms in Machinery Hall, on the fifth floor of the Grand Central Palace, New York City. Space will be subdivided to suit exhibitors, an area of 55,000 square feet being available. Besides permanent exhibition it is proposed to hold an American Machinery Exposition annually. A publicity bureau will be maintained and manufacturers will be aided in extending their foreign as well as domestic business.

Safety Problems Discussed by Steel Electrical Engineers.—The regular monthly meeting of the Pittsburgh Section of the Association of Iron and Steel Electrical Engineers was held at the Seventh Avenue Hotel, Pittsburgh, Pa., February 19, 1916. The past work of the association in regard to safety work was reviewed. President W. T. Snyder referred to the association being among the first to take up organized safety work in the iron and steel industry, through the appointment of a special committee for this purpose in 1908.

British Illumination Committee.—At the annual meeting of the National Illumination Committee of Great Britain it was reported that a great part of the international work had been wholly suspended during 1915, and during the year 1916 co-operation would be impossible. Therefore, the committee will concentrate on subjects already before it. The committee asked the National Physical Laboratory and teaching institutions to investigate and determine the height of the Amyl acetate flame, which affords the light of one standard candle, and A. P. Trotter has made a comparison of results obtained, as a result of the appeal, by Dr. Houston and Professors Mather, Marchant and Morris.

Power Plant on Model Farm.—E. C. Burchfield, of Athens, O., has just completed an electrical installation at the model farm of Judge J. M. Wood which gives a wide variety of service. The power plant consists of a 10-horsepower gasoline engine, which runs the generator set and also furnishes power for the operation of a feed and ensilage cutter and a feed grinder. The current generated is sufficient for both light and power for the house, barn and other parts of the premises and is used for the operation of a number of electrical appliances on the farm.

Louisville Jovians Elect Officers.—At the annual election of the Louisville Jovian League, held February 22, Frank H. Miller, superintendent of motive power, Louisville Traction Company, was elected president, succeeding Robert Montgomery, manager of the commercial department, Louisville Gas & Electric Company. P. S. Pogue, general manager, Louisville Home Telephone Company, was elected vice-president, and Paul Tafel, of the Tafel Electric Company, was re-elected secretary and treasurer. Frank E. Good, T. B. Wilson, Charles Smith and W. D. Rauch were elected members of the board of directors. March 17 has been named as the date of the next Jovian rejuvenation.

South Dakota Central-Station Men Form Organization.—A meeting of central-station owners in the state of South Dakota was held in Sioux Falls February 22, at which a permanent organization was formed under the name of the South Dakota Power Association. The following officers were elected: President, Robert Ferris, Yankton; first vice-president, N. C. Draper, Consumers Power Company, Sioux Falls; second vice-president, B. S. Hill, Mobridge; secretary, A. H. Savage, Dakota Light & Power Company, Flandreau; treasurer, F. A. Brown, Huron Light & Power Company, Huron; executive committee, W. C. Blanchard, Aberdeen; F. A. Brown, Huron; J. F. Cameron, South Dakota Light & Power Company, Armour; E. G. Sherwood, Mitchell Power Company, Mitchell. The next regular meeting of the organization will be held in Watertown, S. D., in July, 1916.

Columbus Company Makes Gains in Accident Prevention.—The Columbus (O.) Railway, Power & Light Company has just announced its safety first record for 1915. The figures given are in the form of comparison with 1914, which show the following in various classes of accidents: Employees' accidents, 10.2 per cent decrease; collisions, cars and automobiles, 3 per cent increase; car collisions, 35.5 per cent decrease; collisions, cars and wagons, 20.6 per cent decrease; leaving moving cars, 21.7 decrease; boarding moving cars, 4.6 per cent increase. In the matter of collisions between cars and automobiles, Columbus stands without a rival, the report claims. The records of seven other large cities in this class of accidents show an average increase of 28 per cent, as against the 3-per-cent increase in Columbus. The hearty co-operation of all employees of the company is responsible for the splendid safety record, made during 1915, says the report.

Passing of Harrison Street Station

Historic Plant of the Commonwealth Edison Company Being Dismantled—Was Largest Station in 1894

No more impressive example of the tremendous development in the electrical industry could be cited than the dismantling of the Harrison Street station of the Commonwealth Edison Company, Chicago, which is now under way. This station marked an epoch in electric generation. Built in 1893, it embodied many radical features which characterized it as the most important development in the central-station industry—yet in only a comparatively few years it has served its usefulness.

The station was designed in 1892, the year in which Samuel Insull became president of the Chicago Edison Company, and marked the first step in the rehabilitation of the Chicago central-station system. It is interesting to note that during the World's Fair in Chicago, in 1893, many radical departures in electricity generation were shown for the first time, and a number of these were later embodied in the Harrison Street station. In fact, some of the equipment exhibited was purchased and installed. Direct-connected engines and generators were first used on a large scale in this station.

The Harrison Street station was first placed in operation in October of 1893, and was for the first few months used as an adjunct to the main plant of the company, located at what was then known as 139 Adams Street. In August of 1894 the Harrison Street plant was placed in permanent operation, and became the principal generating station of the company. The original equipment consisted of one 1,250-horsepower triple-expansion Edison engine, direct-connected to two 400-kilowatt generators.

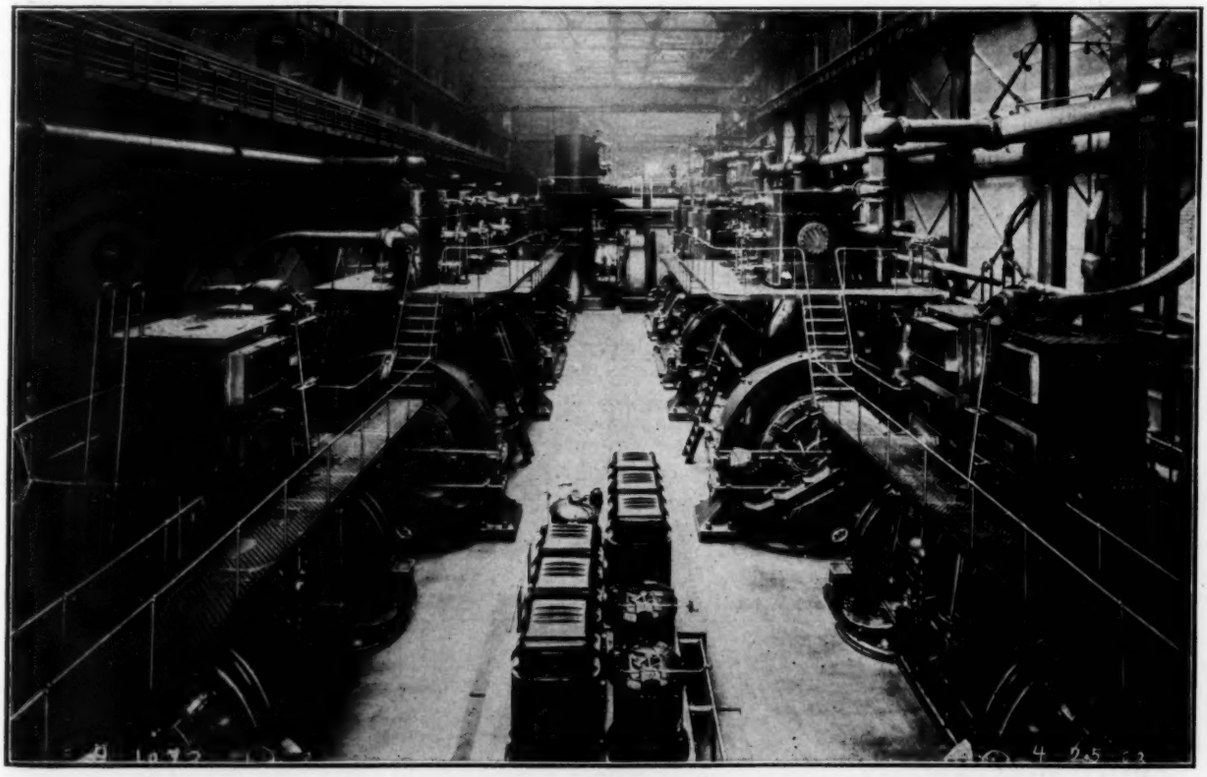
In 1894 four 600-horsepower triple-expansion Southwark engines, each direct-connected to two 200-kilowatt generators, were installed. In 1895 five 1,200-horsepower engines were purchased, each operating two 400-kilowatt generators.

In 1901, a radical departure from previous practices was made by the installation of a 3,500-horsepower vertical cross-compound Allis-Chalmers engine, direct-connected to a 2,500-kilowatt General Electric double-current generator. The latter machine permits the entire output to be taken in the form of either alternating current or direct current. The installation of this generator marked the beginning of the 25-cycle, alternating-current system in Chicago.

In 1902, a 5,000-horsepower, cross-compound engine, driving a 3,500-kilowatt, 9,000-volt, 25-cycle generator was installed, also two 1,000-kilowatt synchronous motors, running as generators. A 2,500-horsepower vertical cross-compound engine, direct-connected to an 1,800-kilowatt, 9,000-volt, alternating-current generator was installed in 1903, and was the last piece of generating equipment installed.

It is interesting to note that the total generating capacity of Harrison Street station, considered in those days an extremely large station, is less than one-half the capacity of a single unit now in use by the Commonwealth Edison Company in Northwest station. On December 15, 1905, the maximum load of the Harrison Street station was 18,827 kilowatts, the highest figure ever reached.

All of the machinery and equipment is being removed, and will be sold, as it is still in good condition, although obsolete, in so far as the stringent requirements of the Commonwealth Edison Company are concerned. The Price Iron and Steel Company, of Chicago, is handling the machinery sales.



Interior of Harrison Street Station of Commonwealth Edison Company Now Being Dismantled.

Electricity in Rural Communities

Data Presented by W. R. Sammons, of Knoxville Railway & Light Company, Indicate Successful Operation of Electric Milking Machines—Other Farm Applications Show Economy of Central-Station Service

Industrial Power Series—Article No. 156

Electricity in a Farm Dairy.

Developments in rural communities show that the farmer is realizing the value of electricity as a partner, and where service is available is beginning to electrify his farm.

Now that summer is coming and the valley of the annual load curve is approaching it is a good time to look for business that will help fill up this valley.

The accompanying illustrations of a farm-dairy installation and the data given show the value of this class of load.

The dairy in question is a part of the business end of a large ranch in the South, and does a fine business in the city communities near. It is located about seven miles from town, and furnishes fresh milk, butter and cream to the people of the city by means of automobile delivery wagons.

In order to provide against extreme summer temperatures a five-ton refrigerating machine has been installed. This is driven by a 15-horsepower motor, and besides providing cold-storage space for the dairy furnishes the necessary ice used about the ranch. One of the accompanying illustrations shows this machine and the motor which is driving it.

The other illustration shows a one-horsepower motor driving churn and separator.

This business makes a good class of load, as the peak comes in the summer, as shown by the data given herewith.

Number.	Size.	Speed.	Application.
1	15	1,200	Driving 5-ton refrigerating machine.
1	2	1,800	Driving well pump.
1	1	1,800	Driving churns and separators.
1	0.5	1,800	Driving brine circulating pump.

The energy consumption for eight months on this installation was as follows:

May	1,048 kilowatt-hours	September	1,370 kilowatt-hours
June	1,048 kilowatt-hours	October	682 kilowatt-hours
July	1,690 kilowatt-hours	November	102 kilowatt-hours
August	1,260 kilowatt-hours	December	92 kilowatt-hours

Besides the motors indicated above, this power customer also has a 50-horsepower motor, which is used for general purposes on the ranch, and is operating a cotton gin and oil mill electrically, the latter two plants having been installed since the operation of the dairy was started.

Milking Machines Successful in Knoxville Dairy.

W. R. Sammons, commercial manager of the Knoxville

A 15-Horsepower Motor Driving Ensilage Cutter and Filling Silo on Texas Farm.

View Showing Milkers in Operation.

Churns and Separator Driven by One-Horsepower Motor.

Railway & Light Company, contributes the following interesting account of an installation near Knoxville:

Within the past few years everyone has observed with much satisfaction the increasing demand for pure foods, together with pure-food laws which have been enacted from time to time. Just what constitutes purity in food seems, in many cases, to be a question for the courts to decide, but in the dairy business the degree of purity of the product depends almost wholly on the sanitary conditions existing in the dairy, and in this connection electric power has played an important part, not only in increasing cleanliness, but in cheapening the cost of production.

One of the greatest drawbacks to those engaged in the dairy business has been the difficulty in having the work of milking cows properly done. There is a great deal of drudgery in milking by hand, while at the same time it is delicate work, that requires particular intelligence and care.

For many years various devices have been brought out for milking cows mechanically, and the need of such an apparatus has caused dairymen to persist in their experiments until a machine has finally been produced which is entirely practicable. Several makes of mechanical milkers are in use throughout the country with complete success, and the number in use is rapidly increasing. The best machines are operated by electric power, driving a suction or vacuum pump connected to a pipe line, which runs through the barn or cow sheds above the stalls.

The milkers are, of course, movable units, which can be moved from one cow to another as the milking progresses, the unit being attached to the pipe line by means of a flexible tube. At the side of the milker is a hose, which branches to four other short lengths, to which are attached four cups that are fitted to the udder, as shown in the accompanying illustration. When the machine is in operation the vacuum passes through the milking unit, and is applied directly at the cups, the suction being sufficiently strong to withdraw the milk which flows down the tubes into the reservoir.

The milking machine is equipped with a device known as a pulsator, which intermittently cuts off the suction, to keep in from being constant. Compressed air is also applied to the cups, alternately relieving and applying the suction. By this arrangement the old method of hand milking is duplicated as closely as possible. The machines are easily regulated to give any number of pulsations per minute.

The advantages of the mechanical milker are very apparent, as with this apparatus milk is produced that is absolutely clean and practically free from any germ life. In addition, a great saving is made in both labor and time.

The country surrounding Knoxville, Tenn., is widely known as an excellent agricultural and dairy section, and many stock farmers have taken advantage of the electric service furnished by the Knoxville Railway & Light Company. Among the farms which are using electric power are the Valley View Farm, Sterchi Stock Farm, and Maple Hill Dairy Farm. These farms use power not only for the milking machines, but for cutting ensilage, threshing grain, pumping water, lighting and operating household appliances.

All service furnished these farms is single-phase, 60 cycles, most of which is 110 volts.

The energy consumption varies, of course, with the seasons of the year, in so far as cutting ensilage is concerned, but the consumption for pumping water, milking machines and cream separators and churns is constant.

The use of the machinery for milking and operating the cream separators reduces the time and labor, as referred to, as it requires only about two men to look after the milking of a herd of 50 cows, and the milking time required is only one hour per milking, or about two hours per day. This enormous saving of time enables the dairyman to get his product ready for early morning delivery, and enables the consumer to have today's milk today, which is worth while.

For a dairy consisting of approximately 50 cows the average consumption is about 200 kilowatt-hours, which includes milking machinery and cream separator. This means a cost of approximately $15 per month with the average rates for energy.

For ensilage cutting and grain threshing, the average consumption of a 15-horsepower motor is about 1,000 kilowatt-hours. This, of course, means operating at a varying load-factor, which is dependent on how fast the stock comes from the field. While there are certain times of the year for this class of work the farmer may have this motor available for general utility work, such as cutting lumber, wood, or anything which might come up.

The investment in the motor installation is much less than that for a portable steam engine, to say nothing of the danger from fire in the barns, due to sparks from the engine, and convenience. It is not a difficult matter to get the farmer who lives close to the lines to become interested on a small scale in electric power for his dairy, and if he can be shown what can be done with electricity, he is very apt to increase his installation to meet the demands of his business.

The accompanying illustrations show very clearly the motor applications on the farms and in the dairies of this

section. The motor installations pictured are of a 15-horsepower motor, driving an ensilage machine; a five-horsepower motor, driving a Sharples vacuum pump for the milking machine, and a three-horsepower motor driving a cream separator.

It behooves all central stations to impress on the farmers who are conveniently located to take advantage of electric service, as it is profitable to both the farmer and to the central stations.

Serving Farmers in Iowa.

The Upper Iowa Power Company division of the Interstate Power Company, of which W. H. Burtis is president and general manager, owns and operates a lighting system in northeastern Iowa, serving the towns of Decorah, Waukon, Cresco, Postville, Lansing and Frankville, in which the systems are owned by the company, and wholesales energy to the lighting companies in Calmar and Ossian. These are the principal towns in Winneshiek, Allamakee and Howard counties. The power is generated at two hydroelectric stations on the Upper Iowa River, one being seven and the other twelve miles from Decorah. The power is distributed on 13,200-volt, three-phase, 60-cycle transmission lines, the combined length of which is at present 100 miles.

This company has made a practice of serving farmers directly from this 13,200-volt line, through step-down transformers, reducing to 110 and 220 volts, giving single-phase energy for power and light. Efforts have not been made to push this business strongly so far, as it was somewhat experimental. During the first year a large number of transformers were burned out by lightning, and there was some trouble with the primary leads in these small high-tension transformers. This has all been practically overcome by better design in transformers, especially in the larger cases, and better insulation of the primary leads, and by more adequate high-tension fuses. The trouble from this source is now reduced to a reasonable amount, but the expense attending such trouble will naturally be greater than upon city transformers, and must be taken into account in making a rate for this class of service.

This company now considers this farm business practical and profitable at proper rates. The rate which is now made is as follows: The service is metered and sold at 12 cents per kilowatt-hour, with a minimum bill of $5.00 per month upon any installation requiring a transformer having a capacity of five kilowatts or less. The transformer usually installed in one of three-kilowatts capacity, as this is suitable for most every farm.

This company furnishes the high-tension transformer and the high-tension fuses, and horn-gap arresters for protecting same, and installs the same upon its high-tension line. The farmer must pay for all secondary wires and all wiring and expense of the installation upon his premises.

Two important features entering into the determination of the proper rates for this service are the heavy investment and core loss, which are largely in excess of that per residence customer, or per dollar of income in the city. These two features are taken care of approximately in the minimum charge. An example showing the cost of such an installation and the core loss in the transformer is given herewith, as follows:

Cost of three-kilowatt transformer and high-tension fuses installed	$100.00
Interest at 6 per cent, depreciation and maintenance at 10 per cent	$ 16.00
Core loss, 54 watts. Core loss per year, 467 kilowatt-hours. This at three cents equals	14.00
Cost of these items per year	$ 30.00
Per customer per month	$ 2.50

These same items figured upon a transformer serving city residences would amount to less than 10 cents per customer per month. It is, therefore, evident that either a much larger minimum bill or a much larger demand charge must be made for this class of service.

There is, however, a great difference between the rates charged for this service by different companies. It is to be hoped that a more uniform method and scale of rates will be decided upon at an early date. The Iowa Section of the National Electric Light Association is giving the matter attention, and a committee is now at work collecting data on this subject and making a study of it with this purpose in view.

The Upper Iowa Power Company now has 22 farm customers served in this way, and, as stated before, it has never really solicited the business.

Referring to the benefits derived and the approximate cost to the farmer, the company has customers who have lights in their house and barns equal to the ordinary city installation in the house, and exceeding this materially in the barns and yard, and who have a washing-machine motor, cream-separator motor, motor for pumping the water, and a three-horsepower motor for doing light feed grinding. One such customer is now installing a power milking machine. It is very rarely that a bill exceeds $5.00 in any month for this service.

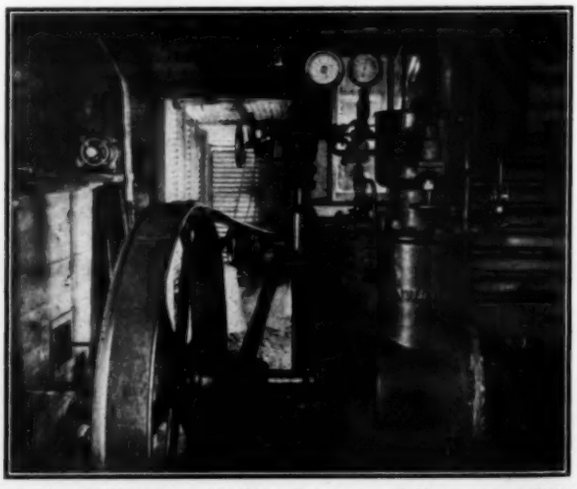
A letter calling attention to this service, which this company is about to send out, is as follows:

Letter to Prospects.

Decorah, Iowa, February 25, 1916.

The Upper Iowa Power Company now has an electric

View of Three-Horsepower Motor Driving Pump and Separator.



Five-Ton Refrigerating Machine Driven by 15-Horsepower Motor.

transmission line or power line passing by or near your farm. This will enable you to have the benefit of electric service from this power line, if you so desire, as this company is ready to install the necessary apparatus for reducing the current for your use upon what we think we can show are very reasonable terms, and such that you can obtain the electric service from this line at a much lower expense than from any other means, and, furthermore, you can obtain a much better service.

The power company will install the transformer and protective apparatus without any expense to you, and they will maintain this transformer. All you need to do is to run the wires from the transformer to your house and other buildings, and wire the buildings. This transformer and other apparatus which the company will install costs them about $100, and, of course, there is some care necessary and occasional repairs, all of which the company assume. This transformer will be large enough so that you can install lights and motors which would require a five-horsepower engine to operate at one time. Besides lighting your house, barn yard, including the use of an electric iron for your wife and a washing-machine motor, you can also pump your water and do such grinding as you can with a three or five-horsepower motor. You can readily think of many other uses for which you can employ this power.

The charge for this service will be at the same rate as that which we charge for lights in Decorah and other towns on this system, namely, 12 cents per kilowatt-hour, and the service will be metered. There will be a minimum bill of $5.00 per month, and the charge will be no more than this, unless during any one month your bill, at 12 cents per kilowatt-hour, amounts to more than $5.00. We find that our farm customers very selodm have a bill in excess of $5.00 per month. We will explain that a kilowatt-hour is one-third more than a horsepower-hour; that is, it would be equivalent to a horsepower operating for one and one-third hours. We might explain, further, that as a 32-candle-power Mazda lamp consumes 40 watts per hour, a kilowatt-hour will operate such a lamp for 25 hours. The cost of such a light would then be practically one-half cent per hour.

Now, referring to the other way in which you can secure electric service, namely, by installing your own plant, consisting of a gasoline engine, generator, and storage batteries, and switchboard. The cost of such a plant, outside of the wiring of your buildings, will be about $500, and of this amount the batteries will cost about $200. With an outfit of this size, namely, about 2.5-horsepower in the engine and 1.33-horsepower in the generator, you could not do anything but light your house and run very small motors, surely nothing over one horsepower, and whenever you would operate any motors, or even use the electric, you would have to keep your engine running, as otherwise you would reduce the charge in the batteries and have nothing left for lighting. This investment of $500 in such an outfit would be what you would have to pay to get electric service in this way in excess of what it would cost you for investment to get it from the power line.

A fair estimate of the cost of operating such a plant, including all of the items which must be considered in the long run, would be as follows:

Kerosene or gasoline for power for lighting only, $18 to $24 per year at present prices—average	$ 20.00
Interest on $500, at 6 per cent	30.00
Depreciation and repairs on batteries, $200, at 20 per cent	40.00
Depreciation and repairs on engine and generator, $300, at 10 per cent	30.00
Total per year	$120.00

We have taken account of only $500 of investment, as this is the amount that the private plant would cost in excess of investment, if the service is obtained from our lines. This does not include anything for the labor of operating the plant. You can readily see that the cost of operating such a plant will be about twice the cost of obtaining the service from our power line, and as we have explained above, you can, by using power from our line, get a great deal more for $60 than you can for $120 from your own plant.

We would be glad to have you call upon us at Decorah, or drop us a line, saying that you are interested in our proposition, and we will call and make an estimate upon a complete job of wiring your farm buildings.

The method of obtaining the meter readings is this: A slip having upon it meter dials is sent out, on the twenty-fourth of the month; the customer marks the position of hands on dial, from which his bill is calculated, which is mailed to him with a stamped, addressed envelope for return, and he comes in to the city office and pays his bill.

From the above it would seem that every prosperous farmer reasonably near a transmission line which can give him the service should be so served with electric light and power. Hardly anything can be added to his equipment which will give more comfort and pleasure. We have heard it said by the younger members of one family now receiving this service that if they could not have the electric lights they would feel like leaving the farm.

It is surely a great agency in reducing the drudgery of housework, always the bane of existence for the housewife on the farm. It is the latest step to make the farmer's occupation enviable, following the telephone, the automobile, and rural delivery, and we think it is not the least of these.

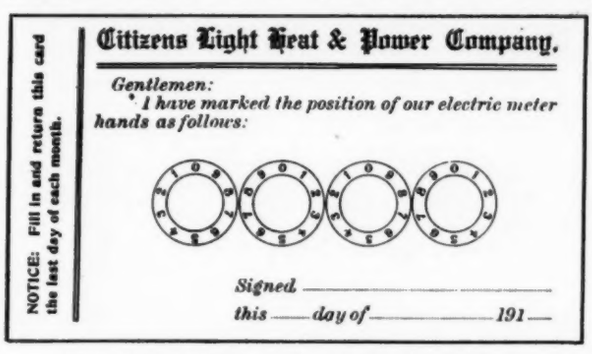
Success in Minnesota.

C. W. Erick, of the Citizens Light, Heat & Power Company, of Canby, Minn., reports considerable success in acquisition of farmer business. His statement of conditions is appended herewith:

"We are supplying electric power and light to thirteen farms within a radius of four miles from town.

"The average cost per farmer for complete installation including his part payment of line, runs about $425.

"Our method of reading meters on the farms monthly is through the post-card system. We mail customers a post card with imprint of meter dials on one side and our address on the other. These they mark the same as meter


NOTICE: Fill in and return this card the last day of each month.
Citizens Light Heat & Power Company.
Gentlemen:
I have marked the position of our electric meter hands as follows:
Signed
this day of 191

Form of Post Card for Reporting Meter Readings.

indicates, and mail to us, then we take reading from card. Our meter readers then check over these readings for correctness about once every six months, being in the spring and fall. This system has proven very satisfactory. Bill of amount used is then mailed on the first of each month, on which they receive a five-per-cent discount by paying within ten days.

"Our farm customers' average cost per month is from $4.00 to $6.50. On this amount they do their ironing, washing, pumping, separating and feed grinding, as well as having light in all barns, haymow, granary and house. In fact, every place that light is needed they have it.

"Our present farm customers are our solicitors for more customers, as they are so well pleased that they always say a good word for us in this line. The sizes of these farms run from 160 to 240 acres."

The following is the proposition made to farmers by the Citizens Company and which is expected to result in considerable business this spring:

For the sum of $438 we hereby propose and agree to equip your farm with motors and lights, as follows:

One three-horsepower motor with pulley and sliding base, installed to operate a six-inch mill and belt, to be supplied by owner.

One one-half-horsepower motor with pulley, belt and Stickney pump jack and automatic pressure switch, connected to pump or pump head supplied by owner.

One light in cellar with switch at top of stairs.

One light and ceiling chain pull fixture in each room, except parlor and dining-room, where a three-light fixture may be chosen, not to exceed $6.50 each.

Three lights in horse barn, with switch near door.

Three lights in cow barn, with switch near door.

One light in haymow, with switch near ladder.

Two lights in granary with switch near door.

One light in pump or milk house, and switch with all

Five-Horsepower Motor Driving Vacuum Pump.

transformers, poles and wires necessary to connect to present line.

You may turn the ownership of the pole line and wires over to us, and we will maintain the same in good repair, otherwise if you wish to keep ownership you will also be obliged to maintain same.

If this seems satisfactory kindly sign and oblige.

Farmer's Attitude.

The attitude of the farmer towards central-station service is admirably expressed in the following letter, received by the Citizens Light, Heat & Power Company:

Since I have had electricity installed on my farm, two months ago, for illumination and power, I have become entirely convinced that it is the greatest improvement any farmer can make, that is considering it from the standpoint of the amount of time and labor that it saves, and also from the financial standpoint.

First of all, will I consider its great improvements of light over the kerosene or gas lights. There is no danger of a leaky gas pipe, nothing at all for the owner to look after, we can rest assured that all is safe, and the lights are always ready to respond to the turn of the button.

Then all the dirty work that the housewife formerly had to do, such as cleaning dirty lamps, chimneys, filling the lamps with kerosene and all other kinds of disagreeable work is done away with.

Better still, then, is its advantages in the house, and there is no danger of one's barn being set on fire by some careless workman upsetting his lantern in the haymow, and causing great loss. The light is decidedly better than lanterns. The entire barn can be lighted up in every corner, while a lantern lights only a few feet around it. A workman does not have to be bothered by continually carrying the lantern with him wherever he goes. This becomes very monotonous for any farmer, especially in the cold weather of the winter months, when most of the chores are done by lamp light.

So far as power is concerned I firmly believe that there has not been anything invented that can compare with it. When one wants to pump water all he has to do is to turn on the switch and the water comes. Formerly one would have to stand and try his temper on a gasoline engine for about half and hour, when it's cold, to get it started. Many a time a farmer will have to work with the cold iron of a gasoline engine until he is almost frozen, and then very likely he will have to pump by hand. When one has electric power he does not have to be a gasoline engine expert or an electrician. The electric company repairs the motors and lines on short notice.

Then the little motor under the washer. My! but it's a dandy. There is no danger of the washerwoman getting her clothes caught in the pulleys and flywheels of the gasoline engine. No extra man is needed to watch the engine or to turn the machine by hand. The housewife can do it all herself, and other household duties at the same time. Then comes the powerful three-horsepower motor, which pulls a six-inch feed mill and a two-hole corn sheller at the same time, fed to their fullest capacity, without a moment's notice of the operator's attention.

The flatiron for the housewife greatly lightens her burdens.

Considering electricity from the financial standpoint, I know from actual experience that electric lights are much cheaper than the old kerosene lights, when you figure the cost of kerosene lanterns, globes and chimneys that are broken very often.

The electric power is cheaper than any gasoline engine will ever be. You consider the price of a five or eight-horsepower engine to grind with, and compare with the three-horsepower motor, a one or two-horsepower engine is also necessary to pump and wash with and do other light work. These engines burn a large amount of gasoline, which at the present price soon becomes a large bill. Then there are batteries, which have to be replaced at least every six months. Lubricating oil is also very high priced, and repair bills add a great deal of expense to the operating.

I can do all the work that the above engine will do with the motors I have mentioned, for at least half the expense of gasoline power.

I firlmy believe that electricity is the greatest labor device known. I believe it is the greatest necessity of the American farmer. Yours truly, L. F. Miller, Canby, Minn.

Power Companies to Install High-Capacity Turbogenerators.

Many turbogenerators of high capacity are being installed or contracted for by the large power companies of the country. Among these are the Commonwealth Edison Company, Chicago, and the Duquesne Light Company, Pittsburgh, orders having recently been placed with the Westinghouse Electric & Manufacturing Company.

The Commonwealth Edison Company has ordered for installation in its Northwest power house a unit consisting of a three-phase, 60-cycle, 12,000-volt, tandem, compound turbogenerator rated at 30,000 kilowatts. This unit consists of a high-pressure turbine, a low-pressure turbine and one generator, all in tandem on one shaft, operating at a speed of 1,200 revolutions per minute. This unit will be capable of carrying a momentary overload of 35,000 kilowatts. The turbine will be served by two Westinghouse 28,000-square-foot surface condensers which will maintain at full load a vacuum of from 28.5 to 29 inches.

The Duquesne Light Company has purchased, for installation in its Brunots Island power house, a three-phase, 60-cycle, 12,000-volt cross-compound turbogenerator, rated at 40,000 kilowatts. This unit consists of a high and a low pressure turbine driving separate generators which operate in parallel. The speed of the high-pressure element is 1,800 revolutions per minute and of the low pressure 1,200.

Annual Meeting of Associated Manufacturers of Electrical Supplies.

The annual meeting of the Associated Manufacturers of Electrical Supplies will be held on Thursday, March 16, 1916. In the afternoon of that day at two o'clock the business session of the meeting will be called at the Hotel Biltmore, Forty-third Street and Madison Avenue, New York City.

The Executive and Associate representatives of member companies are asked to attend the business session, that the important matters to be presented at the first annual meeting of the Association may receive consideration by all its membership.

After the business session of the Association, at which will have occurred the election of new members to the Board of Governors, the regular organization meeting of the Board of Governors will be called.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

CENTRAL-STATION HOUSE-WIRING CAMPAIGNS.

Some Suggestions Based on Successful Sales Efforts.

Every spring efforts are made to increase business from the wiring of already-built houses. In some instances special campaigns are carried on, based on special offers, while in other cases extra sales effort is relied upon entirely, no special inducement in the way of reduced prices or premiums being offered. Both plans are successful.

For the coming spring elaborate plans are being formulated to stimulate house wiring, and under the auspices of the Society for Electrical Development a comprehensive movement has been inaugurated to enlist the co-operation and support of all elements of the electrical industry.

In the following paragraphs some suggestions are offered central stations, which are based on campaigns which have been tried and found successful. Some particularly valuable ideas may be obtained from the experiences of the Louisville Gas & Electric Company.

Comparatively few cities in this country have as many as 50 per cent of the houses wired for electric light out of the total in the city which could reasonably be expected to use electric light. In Eastern cities this percentage is probably as low as 25 per cent, therefore, the outline of a practical house-wiring campaign, that has been tried and found successful, will, without doubt, be of interest to all central-station companies.

A house-wiring campaign was started in Louisville, Ky. (population 250,000), some time ago, with the results that the Louisville Gas & Electric Company is now adding to its lines an average of 70 old houses per week, from the campaign proper, with a total result of approximately 150 new residence consumers each week, as the direct and indirect result of the house-wiring campaign. The average cost of the wiring, including fixtures and 40-watt Mazda lamps, is $36.43 per house. In starting this campaign in Louisville, the residence portion of the city was divided into five districts, with one house-wiring salesman being assigned to each district. It is estimated that there are approximately 40,000 residences in Louisville, and that, of these, there are 15,000, at present, connected to the company's lines. Assuming that 50 per cent of the remainder is prospective, at this time, there are approximately 12,500 old unwired houses which are considered prospective lighting consumers. It is the intention, in Louisville, to keep this campaign going, until practically every home in Louisville is wired or connected to the company's lines, should it be found that some of these houses are already wired but are not connected. If a thorough canvass were made, in any city in the United States, to ascertain the number of houses wired, but not connected to the lighting company's lines, the result would be surprising. In one large city such a canvass showed that there were as many houses wired, but not connected, as there were of residences taking service from the lighting company.

Difficulties Encountered in Launching a Campaign.

Many central-station companies have discontinued the practice of selling appliances and doing house wiring, and not desiring to enter into this business, even temporarily, they are often confronted by difficulties which seem almost insurmountable, especially when it is a question of making satisfactory arrangements with the electric contractors to do the work. This difficulty was experienced in Louisville, since the Louisville Gas & Electric Company does no piping or wiring, nor does it sell appliances of any kind, this being the policy of all Byllesby properties. Therefore, with a view of enlisting the necessary assistance to carry out such a campaign, the contractors were invited to attend a noonday luncheon for a conference. The entire matter was laid before them. There were given figures showing the large field of operation. The campaign was carefully outlined, and the number of unwired houses in Louisville calculated. The contractors were given to understand that the company would spend a large amount of money in advertising the campaign in the daily newspaper, through hand bills, and, through its five salesmen, would be able to hand them a large volume of business which would warrant their making prices that would be satisfactory to carry on a successful campaign. It was pointed out to the contractors that they could pool their interests, purchase materials as a single jobber, and effect economies in taking care of the business handed over to them by the lighting company, to say nothing of other business which would come directly to them at a much lower cost than they have ever been able to do heretofore. These contractors were requested, at this meeting, to submit specifications and quotations, on a flat-rate basis, making a price, per outlet, for the wiring, also a flat price for each fixture, hung complete, ready to burn, including 40-watt Mazda lamps, figures based on a standard line of fixtures. The Louisville Gas & Electric Company proposed to bear all expense of a vigorous advertising campaign and to have five of its salesmen, referred to above, secure the house-wiring contracts, contracts to be taken between the consumer and the contractor, the company not being a party to the contract, but merely acting as a sales agent.

WIRING SPECIFICATIONS AND SCHEDULE OF PRICES

LOCATION	Ceiling Outlet	Bracket Outlet	Wall Switch Bracket Outlet Base Switch	Ivory Base Switch (Two)	Base Receptacle Recpt.	M. M. Bracket Brick Wall	M. M. Base Brick Wall	Concealed B. X Bracket Brick Wall	Concealed Flush Box Brick Wall	Open Work per Outlet	Base Receptacles
PRICE EACH	$2.50	$2.50	$2.75	$6.00	$3.00	$3.00	$3.50	$4.50	$6.50	$1.50	$1.50
Porch,											
Vestibule,											
Reception Hall,											
Reception Room,											
Living Room,											
Library,											
Dining Room,											
Lavatory,											
Pantry,											
Kitchen,											
Basement,											
Rear Hall,											
Upper Hall,											
Upper Rr. Hall,											
Bath,											
N. E. Chamber,											
S. E. Chamber,											
N. W. Chamber,											
S. W. Chamber,											
Chamber,											
Chamber,											
Closets,											
Flush Switches and Flush Base Board Recpts. $1.00 extra each.											
Four, Five or Six, Outlet Contract, at $3.00 per Outlet.											

Wiring Schedule Used in Louisville with Marked Success.

The above plan, it will be seen, does not necessitate the contractor spending any time in obtaining the business. In view of these facts, and considering that contractors would be relieved of all advertising and selling expense, as well as the cost of making estimates, it was reasonable to expect some very attractive prices from them.

Contractors' Prices High.

After due deliberation, the contractors submitted specifications and quotations, which were rejected by the company because they were too high to make the campaign a success, in fact, the prices were no lower than the average price regularly charged.

An application blank was then compiled by the company which constituted a form of contract between the contractor and consumer, in which the contractor agreed to do the work, on a time-payment plan of 25 per cent cash, on completion of the work, the balance to be paid in twelve equal monthly payments, the entire charge subject to a discount of 10 per cent in the event the consumer desired to pay cash within ten days after the work was completed. The contract blank was prepared in such a way that it was a very easy matter for the consumer and salesman to select the fixtures and the kind of wiring, location of switches, etc., best suited for the particular residence and ranging in price from $10 to $150, as best suits the pocketbook of the consumer. As soon as this application had been compiled, it was submitted to the contractors. They considered the prices entirely too low, and, in a body, refused to take up the work at the prices named.

One Contractor Accepts Company's Schedule.

Fortunately, a few days later, one contractor voluntarily accepted the company's schedule of prices and contract, providing the company turned over to him all of the work. After the company had satisfied itself as to the ability of this contractor to finance such a large business, on the time-payment plan, the campaign was launched.

In addition to the large number of contracts that the company is turning over to the contractor, he is now receiving practically an equal volume of house-wiring business which comes to him without solicitation, induced, no doubt, by the advertising of the company's campaign.

All Electric Contractors Benefited.

All the other contractors are apparently doing a much larger business, since the campaign was started, than they had been doing before. Also the sale of portables, electric irons and other appliances has increased materially, at all supply houses and dealers. The contractor, to whom the company turns over the house-wiring business, found it necessary to perfect an organization capable of handling such a large business efficiently and included in his new organization is a credit man, who passes on all accounts; a trained fixture salesman in charge of fixture room, who takes care of the many customers who prefer to call and see the fixtures, rather than select them from a salesman's catalog, and an outside superintendent in charge of 42 wiremen.

The capital required by the contractor to carry on the business, as outlined above, is approximately $25,000, and, to be successful, a contractor must carry on and watch his business as carefully as any successful merchant would.

Cash Prizes to Salesmen.

As evidence of the contractor's satisfaction with the prices adopted in Louisville, it should be noted that he voluntarily furnishes to the commercial department of the Louisville Gas & Electric Company $10 per week, which is given as prizes to the two salesmen securing the largest number of house-wiring contracts each week, $6.00 to the highest man and $4.00 to the next highest. In addition to these prizes, the company gives a cash prize of $10 to the salesman showing the highest efficiency each month, a certain percentage being added for every kilowatt contracted for and connected, also for working overtime, turning power prospects over to power and gas salesmen, taking care of complaints, etc., a deduction being made for tardiness, carelessness and for other similar reasons. The relative standing of each man is posted daily on a blackboard in the commercial department, which has resulted in a keen rivalry

Application for Electric House Wiring.

Louisville, Ky. _____ 191__

The undersigned, _____

_____

hereby make application to _____

hereinafter called the "Contractor," for wiring the premises and installing fixtures as listed herein, at No. _____ in accordance with the specifications and schedules endorsed hereon and attached hereto, which are incorporated herein, and agree to pay therefor at the office of the Contractor the sum of _____ Dollars ($_____) as follows:

Twenty-five (25%) or _____ Dollars ($_____)

on completion of work and the balance in twelve (12) equal monthly payments, or _____

Dollars ($_____) on or before the first of each month following, until the whole amount has been paid. Failure to meet payments when due shall render the deferred payment feature of this contract void, and the remaining payments on said contract shall become due and payable at once.

A discount of ten per cent. (10%) from the above contract price will be allowed, provided full payment is made within ten (10) days from the date of completion of installation.

It is mutually agreed that in event of any modification of the installation specified herein, the amount of this contract shall be revised in accordance with the Schedule of Prices incorporated herein.

The Contractor shall wire said premises and install fixtures as herein specified with forty (40) Watt Mazda or Tungsten lamps, including all labor and material necessary to do the work, covered by the General Specifications and Schedules incorporated herein and made a part hereof, in a thoroughly substantial manner, according to the Rules and Regulations of the National Board of Fire Underwriters as interpreted by the City Electrical Inspector, complete and ready for service.

The Contractor shall save harmless the Applicants from any and all damage or expenses that may arise during the performance of this contract by reason of injury to persons or property resulting from negligence or carelessness on the part of the Contractor in the performance of this contract.

The Contractor agrees to commence work within _____ days of the acceptance of this contract and to complete same without unnecessary or unreasonable delays.

_____ Tenant.

_____ Property Owner. } Applicants.

Accepted the _____ day of _____ 191__

_____ Contractor.

Forms Used by Louisville Gas & Electric Company in House-Wiring Campaign Being Conducted.

Louisville House-Wiring Contract.

Open flames mean matches, and matches mean danger! Electric Light is safe—proof against ignorance or carelessness.
Telephone us today for special house wiring offer
Kansas City Electric Light Company
Fifteenth Street and Grand Avenue
SAFETY FIRST

Advertisement of Kansas City Electric Light Company.

Advertisement Used in Kansas City Campaign.

for first place. The entire commercial department of the Louisville Gas & Electric Company holds a meeting every Saturday afternoon, presided over by Mr. Montgomery. At this meeting a paper is read on some subject of general interest, a lively discussion following. These papers and discussions have proved very attractive and beneficial to the department and to each of the salesmen individually.

It was decided, while public interest is aroused because of general publicity and the special advertising by the company, that the sale of electric irons could, at this time, be stimulated effectively. A large retail tea and coffee company in Louisville, that sells about two dozen staple groceries, on the premium plan, purposes to add to its premium list the choice of two standard electric irons, the premiums being distributed upon delivery of the first pound of tea or coffee, after signing an agreement to take a certain quantity, which entitles the purchaser to the premium. It is through this medium that this aggressive concern, with seven delivery wagons in Louisville, will be able to place a large number of irons on the lines of the company within the next few months.

Any campaign for business can be made successful if planned along the right line and then carried out with the necessary steam back of the efforts exerted.

The reason many house-wiring campaigns "peter out" is not because the plan was wrong, but because the one in charge or responsible is asleep at the switch. All effective advertising must have a punch. The efforts of a department manager, to be successful, must be stimulated by the determination to win. A house-wiring campaign, or other campaign, in the hands of such a man will be successful because it will not be launched until he knows the plan is right and that he can put it into successful execution.

Campaign in Boston Edison Territory.

There are about 160,000 unwired houses in Edison territory, in and about Boston. This represented a large potential business, such as every central station has at hand in greater or less proportion. The small householder is always the hardest proposition. Many schemes which aimed to interest this class failed because the latter could not be convinced of the disinterestedness of the company; they balked at paying contractors' prices for installations. Also, they do not like to be bothered with dickering with a half dozen competing contractors who are out for profit. It has been found by the Boston company that in order successfully to induce householders to sign a wiring contract the company must assume a part of the financial burden. Consequently the company set on foot and carried out the comprehensive house-wiring campaign, by which prospective customers were asked if they would be interested in a proposition to wire their homes at an original investment of $2.35, and $2.00 a month for six months—a total of $14.35. For this expenditure a customer is given a service to the premises, a service pipe in the overhead districts, a meter board wth fuse plugs, and the wiring of one outlet in armored cable, at any location on the first floor, except the ceiling. This proposition was good bait, but of the 918 contracts, only 29 were for the rudimentary equipment offered. Practically all went further and ordered equipment varying in cost from the $14.35 mentioned, up to over $200. The average contract amounted to about $83. The total value of the contracts was $75,800, representing 17,000 fifty-watt equivalents added to the company's connected load, with an estimated income of $21,000 yearly. Cash payments amounted to $7,700, leaving $68,100 to be paid in monthly installments. On this basis the company's financing investment will be taken care of in 15 months and its real investment will be but the interest on $68,000 for about 7.5 months. The net increase in income of $21,000 represents an expenditure on the company's part of only about $2,100.

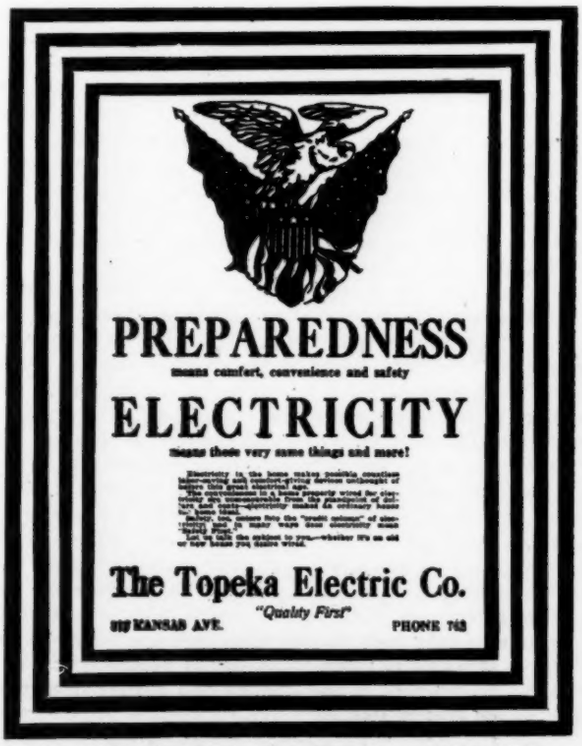
The company contracts to make the installations without even seeing the premises. The customer simply tells where he wants the outlets, the agent checks them from the published list and totals the results. Then the contract is turned over to a contractor without his having viewed the premises. At first there was some opposition on the part of contractors. They felt that the Edison Company would profit at their expense. In making up the price list the company consulted one contractor, who consented to execute any contract obtained at prices quoted. Then the proposition was put before the contractors as a whole, at a meeting at which all were told that they would all share in executing the contracts if they cared to. The result has been that now 200 contractors are executing the contracts as they are turned over to them, and the company is asked daily if there are not contracts on which they can work.

Wiring contractors are paid $2.00 for each new customer secured, plus 25 cents for each outlet the customer contracts for. In this way 248 contracts have been gotten from contractors for which a compensation of $1,265.25 has been paid, or $5.10 per house. This compensation has been shared by 50 contractors, who really act as advance agents.

Another campaign begun some months ago is one by which the company furnishes fixtures for a minimum of 100 watts for interior lighting or 150 watts outside. The inside fixture is a spun-brass canopy with stem and chain, fitted with Holophane prismatic reflector. The outside fixture is a spun-copper inclosed unit with 14-inch glassware that makes it possible to use a 500-watt lamp. In addition to furnishing the fixtures, the company finances the wiring and has adopted the following schedule: 5 outlets, $17.50; 4 outlets, $15.50; 3 outlets, $13.50; additional outlets over five, $2.50 each.

Timeliness in Topeka Advertising.

The Topeka Electric Company took advantage of the advertising opportunity during the recent visit of President Wilson to Topeka, and in large display space, among other advertisers in a special issue of the Topeka *Capital*, exploited electricity as an element in "preparedness."



Attractive Advertisement of Topeka Company in Red, White and Blue Colors.

ELECTRICAL CONSTRUCTION

A Department Devoted to Problems Relating to the Installation, Operation and Maintenance of Electrical Equipment

THE WIRING OF OLD HOUSES FROM THE CONTRACTOR'S POINT OF VIEW.

A General Survey of House-Wiring Campaigns, Plans and Costs as They Affect the Contractor.

Interest in the wiring of old houses is being revived and in order to stimulate activity in this line the period from March 15 to April 15 has been designated as "Wire Your Home Month." Special efforts are being made in this connection through the Society for Electrical Development, which fairly represents all branches of the electrical industry. Anything involving wiring is, or should be, of deep concern to the electrical contractor. In regard to the wiring of houses already built, however, contractors to a large extent show apathy instead of interest; there are certain definite reasons for this. That it should not be the case, however, is self-evident.

This article attempts to review the subject of wiring finished buildings insofar as it affects the electrical contractor. The subject is covered in only a general way, it being the purpose to deal with general policies and not with the details of how the work is done.

Desirability of Wiring Old Houses.

It is not generally known that less than 8 per cent of the houses in this country are wired for electric service. This percentage varies in different parts of the country; in the western and newer portion the percentage is very much higher, running in some exceptional instances as high as 90 per cent; on the other hand, in the eastern, southern and all older portions of the country the percentage is very low. This fact alone shows that there is great opportunity for activity on the part of electrical contractors. Most interest in the subject of wiring finished houses has been taken heretofore by central-station companies. This is only natural because it has been estimated that not 20 per cent of the houses adjoining the lines of such companies now have electric service; this figure is an average figure for the country as a whole.

Central stations have always been endeavoring to increase the size and density of their loads. Since commission and other legal regulations are compelling them to serve all customers who apply for service in their territory, they have been forced to put up many lines to which there are connected but few customers. By increasing the number of customers connected, the density of the load on each line affected is increased and the cost of serving each customer is somewhat reduced. It is evident that a line serving only one resident out of ten or more in a block is not nearly as profitable as a line serving practically all of these residents. If the lighting company materially increases the number of its customers along its lines and thereby reduces the cost of serving them, the rates for electric service are likely to be reduced, which urges other residents to have their houses wired and apply for service. Thus, a stimulus is given to the entire electrical industry and the contractors, manufacturers and dealers benefit as well as the central station.

Need for Aggressive Measures to Get the Business.

It is generally conceded that the new-business managers of the most progressive central-station companies are experts in getting after new business. It has been found from experience by most of these men that in order to get wiring of old houses special efforts are required. The fact that the houses are not wired and served with electricity may be due partly to the fact that their owners have not been aroused to the value of electricity, partly to their fear that the wiring of their premises will involve a great deal of upset, dirt and confusion, but chiefly due to the so-called high cost of wiring. Progressive central-station managers have found the first two of these difficulties to be easily overcome through newspaper advertising and other publicity means. They claim, however, that the third difficulty is a very important one and for this reason have been trying to devise methods for wiring existing buildings at minimum possible cost. The recent agitation for approval of concentric wiring demonstrates this fact. It is also stated that experience proves the most successful campaigns for wiring old houses are those in which special prices and other special concessions or inducements are made so as to arouse the common desire for getting something at exceptional or bargain rates.

Contractors, on the other hand, as a rule have not been enthusiastic for special low prices for the very simple reason that, if a contractor is to escape bankruptcy, he must insure receiving a reasonable profit on all work he undertakes. For this reason a great many contractors have evinced no interest in the subject whatsoever.

Necessity for Co-operation.

This lack of interest on the part of the contractors, combined with the positive assertions of the central-station interests that aggressive means and low cost are absolutely necessary for getting this business, has brought about in many cases very unfortunate conditions. Determined to secure the business, central-station companies have in numerous cities engaged in the work, thus further arousing the enmity of the contractors. In many instances, however, a more reasonable attitude has been taken by both sides and after conferences in which a desire to talk the matter over frankly and understand each other's problems has been shown, a friendly feeling has developed and successful co-operative schemes have been put into effect. There is no need to harp on the value of co-operation because of the agitation on this subject in recent years; nearly every one is agreed, in principle at least, that it is highly desirable.

In undertaking any co-operative scheme, the first thing that should be done is to discuss freely the entire subject from all points of view and especially attempt to make clear the claims of the apparently opposing central-station and contractor's sides. An agreement should then be undertaken on a fair schedule of prices covering different kinds of work and different types of building. Further agreement is then necessary as to how the work shall be solicited, whether advertising is to be carried on, to what extent and by whom paid for. An arrangement should then be drawn up for the equitable division of the work among the contractors in the community. Finally the subject of payment should be agreed on and any plan for ex-

tending the period of payment should be definitely settled.

Before undertaking any co-operative scheme it must be clearly understood that whatever rates are agreed upon must be ample to cover the cost of doing the work by the contractor. Such rates, however, can frequently be made somewhat lower than most contractors are willing to concede on first consideration of the subject. If a strong co-operative arrangement resulting in a definite campaign is brought about, as has been shown in a number of cases, co-operative purchases by a group of contractors will result in decided savings in the buying of materials. If the campaign is carried out so actively as to keep the contractor or at least one of his gangs steadily employed on the wiring of old houses for a considerable period without the expense of soliciting the business or estimating and closely supervising the work or of collecting the account, the overhead expense to the contractor is materially reduced. These features account for the success of quite a number of co-operative campaigns that have been carried out in various cities.

Wiring Plans Most Used.

Of the very many special campaigns for the wiring of old houses which are reported as having been most successful, at least from the standpoint of the number of houses wired and connected for service, the following may be pointed out as being three distinct general classes:

(A) Single outlet or panel, which amounts practically to simply a service switch, cutout and meter loop with one or possibly two outlets for a flatiron and lamp, installed usually in the kitchen. A large number of these installations have been made, especially in small cities or in communities where there are many small cottages and modest homes in which the wiring cost must be kept at the lowest possible figure. The installation of such meager facilities is advocated merely as an entering wedge to demonstrate the advantage of electric service and stimulate the desire for more extensive wiring and more general use of electricity at a future time. Against these advantages there are numerous disadvantages to this plan, of which probably the most serious is that the stimulation to greater use of electricity is so great that the householder himself undertakes wiring his entire cottage or home. Many houses have been found in which lamp cord has been run from a single outlet to every room in the house, the cord being run around doors and windows and tacked on the wall with ordinary staples. The hazard of such an installation is self-evident.

(B) Wiring each principal room, but with a minimum number of outlets and the cheapest possible fixtures or only drop lamps without fixtures. The advantage of this plan again is its cheapness and that it overcomes the likelihood of attempts by the owner to wire his own premises. The disadvantages, however, are that in the attempt to make a very cheap installation, inferior wiring equipment is installed, necessitating considerable maintenance on the part of the central-station company due to the frequency with which fuses are blown. Moreover, the use of bare drop lights is a relic of the early days of electricity and the most advanced electrical and illuminating experts agree that all efforts possible should be made to overcome this tendency by insisting on at least well screened lamps and shades. Where each room is provided with only one outlet, as is the common practice under this plan, the desirability of more convenient means of connecting portable lamps and other appliances frequently produces patched-up wiring on the part of the owner or tenant. The small number of outlets also hinders the more liberal use of portable appliances.

(C) Wiring the entire building as completely as it would have been wired if the work had been done during erection. Needless to say this plan has been followed out in relatively few cases. However, from all standpoints it is by far the most desirable. It overcomes all objections to the two preceding plans and has the only disadvantage of being relatively costly. In many cities the deferred-payment plan has been followed with great success and the adoption of this method of extending the payments over a considerable time permits carrying out plan (C) in a very much larger number of cases than is usually considered possible.

Attitude of Contractors on These Plans.

Opinions have been obtained from a large number of contractors representing the relative merits of these principal plans and also modifications thereof. Plan (A) is almost universally condemned, not only by contractors but also by electrical inspectors. In the small cities, plan (B) has met with some approval on the part of contractors. It has been most successful where a large number of buildings of one kind, as four-room cottages, have been wired on the same general plan and with practically the same equipment. In such cases co-operative campaigns have been worked out to the advantage of both central station and contractor. An improvement on plan (B) whereby, although the number of outlets installed is still small, say one per room, yet the installation is made with all the thoroughness and with as good equipment as the best practice requires, has met with favor on the part of some contractors. Practically all are agreed that plan (C) is by far the best, not only in that it makes it worth while for the contractor to put in an installation of reasonable size, but that it will give the most satisfaction in the long run.

Deferred Payments.

Contractors in general have regarded with much favor the plan of financing the wiring installation by the central-station company. In this plan the work is done by the contractor and when it is completed he receives full payment. The owner of the house can extend the period of payment by a system of monthly installments covering in some cases six months, in others one year and still others up to two years. The central station carries the account and charges interest thereon to the owner. Contractors favor this because it is much easier for the utility company to increase its working capital than it is for the contractor, who, as a rule, cannot secure sufficient capital to carry a large number of outstanding accounts. Since the central station can easily carry out a scheme of making the customer add his monthly payment to the bill for current and since it has the continued benefit of the patronage of the customer, it is looked upon as being the party best capable of handling the installments.

One contractor pointed out that the plan of deferred payments which is coming into such extensive use in nearly all lines of business is bringing into the realm of necessities things that were formerly looked upon as luxuries. For example, pianos, phonographs and automobiles are now very commonly purchased on the installment plan. Therefore, the purchasing of a good wiring system combined with decent fixtures can be carried out as well by this plan. By following the installment method of payments the burden is spread over a considerable period and the customer at the same time enjoys the privilege of full use of the facilities purchased. He is also enabled to purchase a much more expensive installation and one more complete and satisfactory in every way than by accepting a meager wiring scheme with cheap and stereotyped fixtures.

Wiring Costs.

The cost of wiring an old building depends upon a large number of conditions. In the first place it depends upon the nature of the wiring regulations of the community. In small cities, where exposed wiring, wiring with molding, or

concealed wiring on the knob-and-tube system is permitted, the cost is evidently very much lower than in the large cities, in which none of these systems is permitted, and the installations must be made entirely with rigid or flexible metallic conduit. The cost also depends upon the prevailing market prices of materials, which, in the case of copper wire, at least, have shown a decided rise during the past year. It also depends upon the cost of labor. Consequently, figures that are frequently cited in connection with house-wiring campaigns cannot be accepted by the contractor as applying to his own conditions without exact knowledge of the conditions prevailing in the place from which the figures are reported. Therefore, the exceptionally low cost figures, such as wiring a four-room cottage for $15 or less, which are frequently reported in this connection, are of practically no value to the contractor in a large city, such as Chicago, Philadelphia and New York.

Every contractor has heard in the last few years speeches and appeals for keeping close track of costs. If he has developed an accounting system which permits this he is in good condition to talk intelligently to the central-station representatives when plans for a co-operative campaign are being discussed. It is usually conceded that in order to appeal to the owner of an already built house successfully, it is necessary to give him a definite figure without elaborate preliminary estimate; therefore, an agreed specified price (subject to modification on important changes in market prices) for a certain type of outlet in a certain type of building is desirable, since it permits the solicitor to name a total price with little computation, and, therefore, greatly increases the likelihood of securing the business with little effort.

Although a statement of low-cost figures, as a rule, is not of much value, unless the conditions are exactly similar, yet a knowledge of what is being done in the case of medium and first-class installations is of interest to the contractor, as showing him what may be done under favorable conditions that can frequently be attained.

A contracting firm in New Haven, Conn., which has made quite a success of old-house wiring during the last few years in co-operative campaigns with the local central-station company, reports the following cost figures:

			Cost per Outlet.		
Year.	System.	No. of Outlets.	Material.	Labor.	Material and Labor.
1912	.....	4,952	$1.15	$1.38	$2.53
1913	.....	320	.....	.....	2.18
1914	.....	993	1.16	1.20	2.36
1915	Knob and tube	915	1.11	1.26	2.37
1915	BX	173	1.80	1.56	3.36
1916	Knob and tube	334	1.28	1.40	2.68

In the above table, for the first three years no attempt was made to keep separate record of costs for knob-and-tube outlets and BX outlets. The figures for 1916 cover only one and one-half months; it will be noticed that both material and labor costs are now higher than in 1915, showing that a set, inflexible price is not advisable. It is to be noted that these costs are for material and labor only, the overhead expense and profit are not included.

At Lynn, Mass., all the work is turned over to contractors and paid for either direct to the contractor on completion or on deferred payments to the central station, the latter carrying the account. The agreed costs are as follows: Service connection, $11; cellar outlet and switch $5.50; piazza, hall, parlor, dining-room and bathroom, in each case an outlet and switch, each room, $7.75; kitchen, pantry, bedrooms, closets and inside halls, each outlet, $3.25; also each additional outlet, $3.25; outlets with flush wall receptacles, $4.50 each, extra switches, $4.50, three-way switches, $6.75. The fixtures are separate, and, as a rule, relatively inexpensive.

At Providence, R. I., a successful campaign recently inaugurated has included as a special proposition the wiring of 11 outlets, simple fixtures, and a flatiron for $79.50, of which 10 per cent is paid promptly and the remainder in installments of $2.98 per month for two years. The work is turned over to contractors, and the account handled by the lighting company. Extra ceiling and wall light outlets are $3.75 each, extra outlets for wall, baseboard or floor receptacles, $4.25; for basement porcelain receptacle, $4.25; for single-pole flush switches, $4.25, and for three-way flush and for electrolier switches, $4.75.

Chicago Schedule Prices.

One of the most complete schedules has recently been worked out by a revised joint agreement between the Electrical Contractors' Association of Chicago and the Commonwealth Edison Company. For any contracts secured according to this schedule by the contractor the utility company will pay for the work on completion and inspection and let the customer reimburse it through monthly payments extended over two years. The prices given in the table do not include switches or receptacles, but cover wiring only. All wiring is concealed and involves the use of BX flexible iron-armored wire or the equivalent standard of construction.

In this table Class A applies to two-story flat buildings of brick or wood construction, of a character that will rent for $25 to $40 per month, or residences that could rent for $20 to $50 per month. Class B applies to three-story buildings of same renting value as Class A. Class C applies to two-story buildings that rent for $50 and up. Class D applies to three-story buildings renting for $50 and up.

No. of Lights.	Class A.	Class B.	Class C.	Class D.
10	$ 55	$ 77	$ 83	$ 97
11	57	79	86	100
12	59	81	89	103
13	65	89	95	109
14	67	91	101	112
15	69	94	105	116
16	72	96	108	119
17	74	98	111	122
18	76	100	114	125
19	78	102	118	129
20	80	105	121	132
21	83	107	124	136
22	85	109	128	140
23	87	111	131	144
24	89	113	133	147
25	95	121	139	155
26	97	123	142	160
27	99	125	145	164
28	101	128	150	168
29	103	130	154	173
30	106	132	157	177
31	108	134	161	181
32	110	136	164	185
33	112	139	167	189
34	114	141	171	193
35	117	143	174	196
36	119	145	177	200
37	124	157	183	208
38	128	161	185	213
39	131	165	190	218
40	134	168	194	223
41	138	172	198	228
42	141	175	201	232
43	144	179	205	237
44	146	182	208	241
45	149	185	211	245
46	152	191	215	250
47	155	194	218	254
48	157	197	221	259
49	163	205	227	266
50	166	209	231	271
51	169	213	235	276
52	173	217	240	281
53	176	220	244	286
54	179	223	249	291
55	183	227	252	295
56	186	230	256	300
57	189	233	260	304
58	193	237	264	309
59	196	240	268	313
60	199	243	272	317

A special schedule applies to Class E buildings, which are one or one and one-half story cottages with open attic. This is as follows: Seven to 12 lights, $44; 13 lights, $49; 14 lights, $51; 15 lights, $53.

Another special schedule (G) covers the wiring of workmen's homes, particularly wooden, stucco or brick one-story cottages with roughly finished attics. This provides a charge of $12 for installation of service mains complete, including service switch, cutout cabinet, etc., plus $2 per

outlet where the total number of lights does not exceed 12. If more than 12 lights are desired, there is an initial charge of $5 for each additional circuit of 12 lights, plus $2.20 per outlet. It is not contemplated that any switches for chandeliers will be included. A simple assortment of fixtures with shades and pull-chain sockets is available at low extra charge. The complete installation, including 12 lights and fixtures, can usually be provided for under $45, which when spread over 24 monthly payments is not burdensome.

The wiring for all switch outlets is as follows:

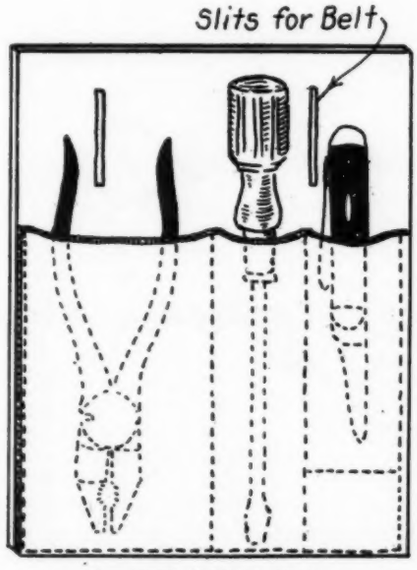
Type.	Class A.	Class B.	Class C.	Class D.	Class E.
Single-pole	$3.50	$4.00	$4.50	$5.00	$3.00
Three-way	5.00	5.50	6.00	6.50	4.50

In addition to the above prices for wiring, there are prices for switches, etc., as follows:

Flush push-button single-pole switch	$1.00
Standard snap single-pole switch	.50
Automatic door switch	1.50
Three-way flush switch	1.10
Three-way snap switch	.50
Drop cord (including spun brass canopy, cord and socket)	1.00
Drop cord (without canopy)	.75
Waterproof floor receptacle	3.00
Flush baseboard receptacle	1.50
Standard wall receptacle	.50

Handy Case for Electrician's Tools.

Herewith is shown a case for pliers, screw driver and knife. It is made of heavy leather and is provided with slits in the back, which extends up higher than the piece which forms the front of the case. The handles of the tools are easily accessible. If worn on the belt it will be



Case of Electrician's Tools.

found very handy for the electrician, since all of the tools are kept together and are readily accessible. The sections of the case are made to fit the tools.

J. Randle.

Electrical Contractors Use Display in Daily Press to Secure Workmen.

Beard & Lyons, electrical contractors at Lexington, Ky., used display advertising space in local papers to advertise for an expert electrician, stipulating the high qualifications required of workmen employed by that company. Although a newspaper of general circulation is not a good medium for such an advertisement, it is pointed out that the contracting concern obtained an indirect benefit through the impression of high capabilities of its employees created upon the lay readers.

Among the Contractors.

C. P. Cochran, electrical inspector at Nashville, Tenn., reported that 1,701 electrical permits were issued in 1915. Total inspections made were 1,846.

Herbrick & Lawrence, Nashville, Tenn., has secured the contact for electric wiring in the five-story building of the Fourth & First National Bank, Nashville.

The Electric Shop, E. C. Nebel, manager, has been opened at Stevens Point, Wis. Beside contracting, electrical fixtures and supplies will be handled.

The Gaines Electric Company, Cleveland, O., has secured the contract for the electrical construction in the new plant of the Mason Tire & Rubber Company, Kent, O.

W. R. Katterjohn has been elected to the board of directors of the Paducah (Ky.) Builders' Exchange and will represent the electrical contracting interests of the city.

The Lavier & Long Electric Company, of Detroit, Mich., has opened a branch office at 112 Campau Avenue N. W., Grand Rapids, Mich., with Herman Gutebunst manager.

The Pacific Fire Extinguisher Company, Berkeley, Cal., was awarded the contract for the installation of a new lighting system in Lighting District No. 1 in Berkeley on its bid of $22,300.

Otto Harloff and Karl Loprich have formed the Harloff-Loprich Electric Company, 109 North Hamilton Street, Madison, Wis. The firm will do electrical contracting and handle supplies.

The Plattsburgh (N. Y.) Plumbing & Electric Company has been formed by C. W. Howe, C. E. Bragg, F. L. Carroll. The new company will do a plumbing and electrical contracting business.

The Weston Electric Company, Cincinnati, O., has been awarded the contract for the installation of power plant machinery in a plant to be constructed by W. S. Chandler at Mt. Olivet, Ky.

The Webster Electric Company, Youngstown, O., has the contract for the electrical equipment of the Salem High School, which includes the wiring for lighting, power, bells and telephone system, all work to be in conduit. Mr. Webster reports business good.

Irvin W. Guthman, formerly of the Bothwell-Guthman Electric Company, Youngstown, O., has severed his connection with that company and is in business for himself at 115 South Champion Street, Youngstown, O., and will handle motors, carry a full line of supplies and do a general electric construction business.

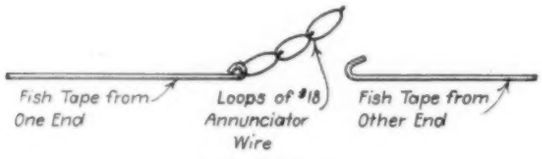
Kohler Brothers, 111 North Jefferson Street, Chicago, Ill., have closed a contract for the installation of six 100-horsepower motors at the factory of the Corn Products Refining Company, Argo, Ill. These motors will replace steam-engine equipment in one of the factory buildings. Power wires leading from the power house will be placed in underground conduit. This company is also doing the electrical construction work in the Sterling Morton High School, Cicero, Ill. This school will have a manual training department employing a large number of individual-motor drives. An isolated power plant, consisting of Western Electric 100-kilowatt and 50-kilowatt generators driven by Ball engines, will be installed.

DOLLAR WIRING KINKS

Every reader is invited to contribute to this page. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Hooking Snakes.

In the issue of February 12 Mr. Myers gave his idea of a method to hook snakes in a run of conduit with bad bends. I have tried that plan a number of times, but did not have as good success from a labor-saving standpoint as with one illustrated herewith.



Hooking Snakes.

The tape from one end has an ordinary hooked end. The tape from the other end has the hook bent to the tape surface, making an eye end. With some No. 18 annunciator wire three small loops are made and fastened to the eye end. When the two tapes are drawn past one another the hook will catch one of the loops on the first attempt.

M. J. Moriarty.

To Keep Tape from Unraveling.

In using friction tape it is very common to find that the tape begins to tear in from the edges in unrolling; this causes the electrician to stop and pull the raveled edge off of the roll of tape, necessitating considerable loss of time and more or less annoyance. To avoid this it is

Tape Arranged to Prevent Unraveling.

necessary merely to cut across the roll of tape with the point of a knife as shown in the sketch herewith; cut on both sides of the roll and in the direction of two cross diameters.

W. D. Wilson.

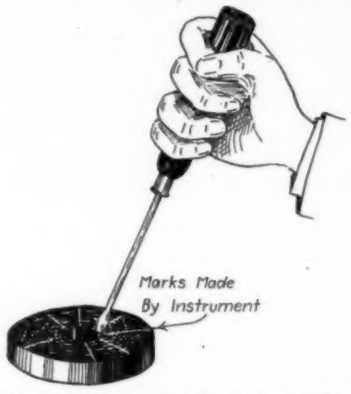
Convenient Fishing for Gang Switches.

In wiring old houses when there are several switch loops to be fished, it will be found to save trouble and time if the fish chain is long enough to allow the wire to be attached to the middle of it after the man below has fished out the lower end of the chain. Then the loom can be pushed back on the wire in the attic and the wire allowed to go through the hole with the chain until it is pulled out below. As soon as the man below takes the wire off and holds it, the chain is pulled back into the attic. The loom is then slipped down on the wire. This will save many trips up and down the ladder and much crawling around in the attic to get the chain again.

J. Randle.

To Protect Rubber Tape.

In using a roll of rubber insulating tape, I find that when new it has a tendency to fall apart and dropping on the floor becomes covered with dirt, which renders it useless. This is remedied by marking it cross-sectionally (from the



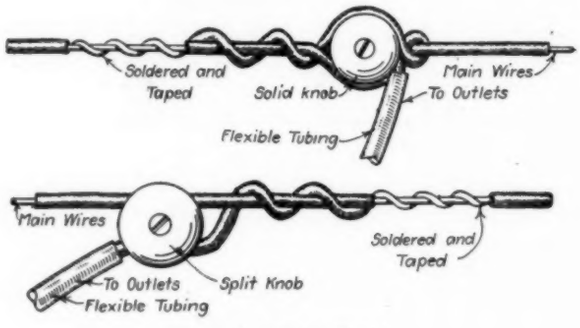
Scheme for Preventing Unrolling of Tape.

inside out) seven or eight times on both sides with a sharp instrument or tool, such as a screwdriver.

Herbert V. Smith.

Outlet Taps in Knob-and-Tube Work.

In knob-and-tube wiring one may frequently save a little time and make a better job where the wires run past an outlet, if the knobs used to secure the wires leading to the outlet are also used to hold the main wires. This is shown in the accompanying sketch both for solid and split knobs. In each case the one knob serves both for the



Securing Outlet Taps.

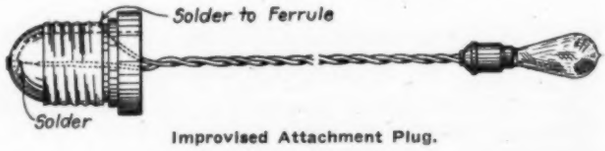
main wire and the outlet tap. Many wiremen use separate knobs for this purpose.

A. F. Stearns.

Improvised Attachment Plug.

On a job the other day I had need of an extension cord and not having an attachment plug available, used an old plug fuse as shown.

Take out the mica cap and solder one wire to inner side of end contact. Bring the other wire from the inside of



Improvised Attachment Plug.

plug to the ferrule or screw-shell contact through the small hole in side of plug and solder. With some types of refillable plug fuses the wires could be attached without soldering, if an emergency required a very quick connection.

F. C. Petersen.

ELECTRICAL MERCHANDISING

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-Keeping for the Dealer in Electrical Goods

THE USE OF DIPLOMACY IN MAKING COLLECTIONS OF POOR ACCOUNTS.

Suggestions to the Merchandizer for Collecting from the Different Classes of Slow Debtors.

By W. B. Parker.

In an article on handling slow collections by mail, published in a recent issue, the writer explained an efficient and inexpensive method of renewing the interest of "Mr. Slow Pay" in the fact of his indebtedness and of placing him in the right mental attitude to facilitate a satisfactory adjustment of his unpaid account. But when "Mr. Slow Pay" answers one of the letters the work of collection is only commenced unless he settles in full at the time. In practice it will be found that he will often pay an installment of the indebtedness, promising to pay the balance at a future date, or will attempt to settle the entire account in promises instead of cash. In either of these cases the right kind of collection diplomacy is needed to complete the work already accomplished in turning a poor account into a good one.

In order to intelligently decide on a plan of action in any given case, it is well to remember that there are just four general classes of slow debtors, and that your particular slow debtor must be first properly classified before the right method of handling him can be judged. We will consider the first class as consisting of those who were abundantly able to pay at the time of contracting the indebtedness but have since met with reverses and through no fault of their own are unable to fulfill their obligations. The second class takes in those who are financially solvent but are given to the pursuit of interests that require ready cash and have gotten into a habit of putting off as long as possible the payment of all charge accounts. The third class consists of those whom we may call the "happy-go-lucky" variety, who contract obligations without at all considering their ability to meet them. The fourth class contains the deliberate deadbeats, who may or may not have means to pay, but who are "law proof" and do not intend to pay any account that can be avoided.

When a debtor of the first class—one who has met with reverses and is really temporarily unable to pay—tells his story of hard luck it is easily possible for the creditor to take one of two positions, either one of which is wrong. On the one hand, he may feel that he had nothing to do with bringing about his debtor's ill luck and that it is nothing to him, that the debtor should sell what he has or borrow the money, but that no matter how he has to get it his account must be paid, and at once. On the other hand, if the creditor is of a kindly, easy-going disposition, he may simply bid Mr. Debtor take his time and pay when he gets ready. Both of these attitudes are wrong.

The correct method is to express a sincere regret for his misfortunes and by adroit questioning ascertain as closely as possible the exact situation and his probable future ability to take care of the account, and accept his promises for the future only to the extent that they seem possible of fulfillment. For example, it would be exceedingly unwise to accept a six-months' note for $200 where the debtor will receive his income in small, occasional amounts and would be required to save up the amount to meet the note. Ths is too much to expect of average human nature, even with the best of intentions. The result might be a payment of $10 or $20 and a request for another six months' extension. In this case, the better plan would be to ask for ten notes of $20 each, payable monthly, commencing, say, sixty days from date with a proviso in each note that it should immediately become due in case of failure to pay any prior note. This offer shows a willingness to help the debtor on his feet by giving him all the time he needs, and creates good will and a disposition to exert every effort to meet the small amounts as they come due.

It is, of course, important that the debtor be notified of all installments as they come due and his interest in settling the account be kept up to the same pitch as when the installment arrangement was made. Where the debtor owes a number of accounts at the time of meeting with misfortune it is clear that the creditor using helpful but energetic methods in handling the case will be the first one to receive his money, as well as to keep the debtor's good will, which means future business and profit.

The second and fourth classes of debtors—those who habitually delay payment, though solvent, and the deadbeats who have no intention of paying at all—are the hardest to handle because in neither case do they make promises in good faith and, of course, their promises cannot be relied upon. An experience of the writer while credit man for a manufacturer will serve to illustrate the usual real reason for slow payment by one well able to pay. A certain highly rated dealer was behind in his accounts and paid no attention to monthly statements or the ordinary letters calling his attention to the matter. Therefore, regardless of his high rating, he was put upon the "high pressure" mailing list—cards sent every other day—which finally induced an answer. His excuse was that he had been putting his ready money in some new buildings and improvements, and could not conveniently take care of his account. In other words, he was using the manufacturer's money for his own business expansion. Diplomatic correspondence failing to change his views, he was given the alternative of paying in full at once or being sued. He paid and his account went to some other manufacturer, but the point the writer is making is that no business house can afford to carry this class of accounts on any terms, and that the only way to handle this class of debtors is to promptly reform their habit of using their creditor's money regardless of terms, or to insist on settlement in full and let someone else have the doubtful benefit of their trade.

The deadbeats are the hardest to handle of all, as their promises are absolutely worthless, and compelling payment by law is usually impossible. As a general rule the best results are obtained by refusing to accept promises to pay in the future for longer than a week or ten days and on each failure to keep a promise, again resorting to "high pressure" mail, in some form of notice every other day—the very persistency of which may get on the debtor's nerves so that he will pay the account in order to avoid the constant annoyance.

Turning Over Stock by Means of Special Sales

An Interview with George B. Johnson, Manager of the Commonwealth Edison Company's Electric Shop, Which Gives Some Pertinent Views on Turn-Over and Special Sales

With the approach of a nation-wide house-wiring campaign an opportunity will be offered to electrical merchandizers for capitalizing on publicity which will be given to the industry. The ideas regarding stock turn-over and special sales suggested in this article will be found particularly pertinent at this time.

"Turn over your stock." What these words mean and imply is the basis of successful electrical merchandising, according to George B. Johnson, manager of the Commonwealth Edison Company's Electric Shop, Michigan and Jackson Boulevards, Chicago, Ill.

"You know," Mr. Johnson said, "turn-over is defined as the ratio of sales during any period to the average capital invested in stock during that period. I believe a stock of electrical appliances should be turned over at least three times a year and some portions of a stock should move as often as six times a year. The ratio of turn-over is the barometer of a business enterprise. Calculating the ratio for periods of different length—say three months, six months, one year or two years—and then making comparison of periods of the same length, there is obtained as positive an indicator of the general trend of business as it is possible to get.

"A minute analysis of the general status of a business for certain periods, through the medium of these ratios, will lead to specific deductions relating to the details of a merchandising business. If the analysis shows an ever-increasing ratio, the progress and its extent will be apparent. It will also be possible to recognize what general conditions and sales methods were responsible for the indicated progress. However, if there are periods of decrease shown by the ratios it will be possible to note them and to deduce some of the reasons therefor, placing the merchandiser in better position to ward against occurrence again.

"There is one element, however, which may affect the ratio of turn-over adversely on paper, but which is allowable and even desirable when the proper conditions are existent. This is the purchase of goods not for immediate sale but for sale in the future. Such goods, on account of the certainty of a rise in price (the increasing cost of metals at the present time is a good example), can be placed in stock and held for future sale if too great an expense is not incurred for interest on the investment, rental for stock room space, and the like.

"Even in this case care must be taken not to over stock on goods, such as silk shades, for example, which will depreciate on account of change in styles or on account of their perishability. On the other hand, a well-chosen overstock of metal and glass portable lamps, purchased at the bottom of a rapidly rising market, is good business, because such goods will not depreciate while in stock, and when the time comes to sell may be either priced higher to agree with the then prevailing selling prices and more profit secured, or if then placed on sale at the regular profit will move out quickly because the same goods are being sold elsewhere at profits com-

A View of the Electric Shop Display Windows During Special Sales Period.

Interior of Electric Shop Showing Special Sale Tags.

mensurate with the higher prices paid by competitors.

"The whole analysis," Mr. Johnson continued, "brings in so many considerations that there is difficulty in putting a finger on the specific defects of a business enterprise. If any exist, the analysis will point them out and the periods during which they occurred. If it is desired to make the analysis more specific, it is possible to make up a set of ratios for the different classes of merchandise, keeping separate records of heating appliances, motor-driven appliances, portable lamps, etc. The deductions made from a set of records of this kind will enable the merchandiser to assume a position best suited to correcting apparent defects in purchasing or selling methods of any certain class of goods.

"The seasons of the year will, of course, affect the ratio of turn-over and this effect must be taken into account in making comparisons of short periods. For instance, the last quarter of the year, which includes the holiday season, should show a greater ratio of turn-over than any other period. The first quarter, which is the dullest sale season of the year, will undoubtedly show the least ratio. In order to make the first quarter of the year show a greater increase of stock turn-over, special sales are usually inaugurated in most electrical merchandising salesrooms. An additional reason for January and February sales is the disposal of seasonable goods, such as portable lamps and gift articles left over from the holiday stock."

Mr. Johnson stated the method of conducting these sales was along lines of procedure carefully worked and carried out. The date of the commencement of the special sales period is made about the middle of January. By that time people who have received electrical appliances or lamps as gifts during the holiday season will have had an opportunity to make any exchanges desired. Another reason for beginning the sale at this time is because the competitors of the Electric Shop, which in the major are the department stores, do not as a rule begin their sales of heavy goods until some time in February. Taking these things into consideration, the timeliness of this special sale is apparent.

While a complete inventory of stock is taken the first few days of the year, the special sale is anticipated by an inventory taken just after the Christmas rush is over of such articles it is thought should be offered for special sale. A list of the different articles is prepared, the number of each in stock, and the original selling price. This list gives a very good summary of what stock has been moving, especially as regards electrical appliances.

The sale is conducted principally for the purpose of turning over seasonable goods. In the particular case of the Electric Shop it is portable lamps and electrical gift novelties. But to make the sale comprehensive of the whole stock, some appliances are included, especially those which have not been moving rapidly. The latter usually consist of appliances which are about to become obsolete or of very slow-moving articles which are not considered good adjuncts to a stock and will not be handled in the future.

When the sales list has been completed, the price reductions are determined. And, as the matter of price-cutting is a much-mooted one, some considerations of prime importance are involved. In the case of portable lamps the difficulty is not so great. The Electric Shop buys portables from 80 different manufacturers and because of the variety and nature of the stock a set retail price is not usually made by the manufacturers of the lines of portable table and floor lamps referred to here. The profit to be made from a certain lamp is determined by the merchant himself. The combinations which may be made with shades and bases of portables allow considerable leeway in artistic effects which give great latitude in pricing them and eliminates to a great extent the competitive element involved in staples. Hence, there is not much difficulty in deciding what reductions should be made for a special sale. But in making price reductions on staple cataloged appliances difficulties are not so easily overcome. The customer can see reasons for a sale of portable lamps, but why should electric irons, which are always staple and standardized as to kind and price, have reduced prices unless there is a diminution of quality? Then, what will be the effect on the competitive dealer? Sales reductions on the less staple appliances are not so noticeable to competitive dealers and do not have an adverse effect on customers. The whole matter is cleared up by including in the sales those appliances which are less staple, and adding a few of the staple articles to give a tone of comprehensiveness to the sales.

When the list of appliances to be placed on sale is completed and price reductions determined preparations for the sale are begun. Of greatest importance are the window displays. Situated, as the Electric Shop is, on Michigan Avenue, where the windows are viewed by discriminating purchasers, there is demanded a different tone of display than could be used on many other streets of Chicago. The difficulty encountered in special sales advertising is utilizing the windows, and yet doing this so unobtrusively that the general character of window display on the avenue will not be affected. One of the accompanying illustrations shows five windows on Michigan Avenue side of the store. The placards and signs at the bottom of the windows were redrawn several times before they were finally used for the sale. Displays in the different windows were frequently changed. The liberal use of price cards can be noted in the illustrations showing the windows and interior of the store. Careful observations of the effects of the different window displays were made, the number of people attracted to each being noted during certain periods of observation. In this way the least attractive windows were made known and new forms of display substituted.

In the store, numerous displays of the special sale articles were made. As much thought and study was given to these as to the window displays and they were changed frequently, both by the sales made and by rearrangements.

But, as Mr. Johnson explained, a special sale is only one way of accomplishing turn-over of a certain portion of a stock, and is but a single phase of merchandising. The principle of turn-over is the fundamental and the merchandiser should keep it ever in mind for the successful conduct of his business.

Jobber Distribution as an Ultimate Economy

An Interview With J. W. Wooley, Sales Manager of the Oshkosh Manufacturing Company, Oshkosh, Wis.

A great deal of discussion and comment, favorable and otherwise, has been aroused among central-station companies and telephone companies concerning the policy of the Oshkosh Manufacturing Company, in marketing its entire product through the legitimate electrical supply jobber. Up to about two years ago the Oshkosh Manufacturing Company sold its product to both the jobber and the consumer—with plenty of accent on the latter. Many features developed which were unsatisfactory both to the consumer and to the Oshkosh Company, and the latter felt that some remedy was imperative.

"It was out of the question," said J. W. Wooley, sales manager of the Oshkosh Manufacturing Company, who was asked to make an explanation of the company's policy, "to attempt to raise prices to the consumer to care for the crying need for 'service,' and as a result we had to devise a better method.

"To convince the consumer that we are familiar with both sides of this discussion," said Mr. Wooley, "I want to say that we made a thorough and detailed study of the question. Among other things we found that the average amount of an order from an operating company was only a small fraction of the amount of an order from a jobber, but *that the cost of filling each order was the same.* While a little time could be saved in assembling the smaller amount of tools listed on an order from an operating company, the saving was lost in the increased ratio of cost of special packing cases, etc.

"A large percentage of these orders," Mr. Wooley continued, "came to us from operating companies that did not have a copy of our catalog, and therefore did not have our catalog numbers available. This necessitated further correspondence to ascertain just what the company required and therefore long delays in shipment.

"Orders for only 80 to 90 pounds of tools came to us from companies 2,000 miles distant from our factory. This meant an immense freight item in view of the fact that the weight of these small orders would not even come close to making up the weight allowed under the minimum freight charge. Investigation of several hundred orders showed that an average of 12 per cent on the total cost of the tools could have been saved by the consumer had he been able to specify enough tools to make up the minimum required by the transportation companies.

"On these orders the matter of 'delivery' time was ascertained and it was found that the average time from date of shipment to delivery was nine days, an item of considerable expense to the operating company in 'delay.'

"We were, as a rule, so far away from the operating company that no accurate credit rating could be obtained. We, of course, used standard rating books but we found them ofttimes unable to do justice to either the operating company, or to us, in view of the fact that the ratings shown were frequently those made a year previous. Many times no rating was shown.

"Special reports were out of the question for two reasons:

"1st—The small amount involved would not warrant the expense, and

"2nd—the delay while securing this report. As a result of our not being able to handle these 'credits' satisfactorily a considerable amount was annually charged off to profit and loss. A large percentage of this could undoubtedly have been recovered by suit, but here again the small individual amount involved precluded the possibility of such action.

"After all was said and done," Mr. Wooley continued, "the one great underlying objection to selling or marketing tools direct was the lack of 'service.'

"A large percentage of tool requirements are for emergency work and, in any event, owing to the relatively small amount of tools used in comparison to such other items as poles, pole-line hardware, and so forth, less consideration is given this matter by the storekeeper than on items of which large amounts are required. As a result tool requirements are not specified until the supply is exhausted and 'service' is imperative.

"For these reasons the desired 'service' cannot be obtained from the average manufacturer."

"What about the 'economic' side of this problem?" Mr. Wooley was asked.

"Our experience in the last two years," he replied, "has been that we can sell tools to the jobber, who will maintain a large and representative stock, and arrange a fair profit for him and still deliver the tools to the operating company at lower prices than we would have to charge if we sold to it direct.

"By selling the jobber," Mr. Wooley pointed out, "our line is exploited by all his traveling salesmen at a small fraction of what it would cost us to do the same work. It is self-evident that the selling cost, whatever it is, must be paid for by the consumer.

"The jobber's salesman will call at least four times to the manufacturer's once. Being in close personal touch with the consumer, the jobber's salesman has many friendships among the trade. He knows when to sell and when not to sell and for him to solicit an order for his jobbing house is in many cases equivalent to securing it. He has made a close and careful study of his particular territory and, it being local in scope, he is enabled to save time and money that the manufacturer could never hope to. He has not only one line to sell but probably hundreds of others and his selling cost is so prorated among these lines that as a result he is enabled to call on his trade oftener and sell more and at far less expense than had he the one line to exploit.

"Now why can we arrange our prices to the jobber so that he can sell the goods to the consumer cheaper than we can sell them to him direct, to say nothing of the saving on the shorter less-than-carload freight haul? Let us summarize:

"1st—Our selling expense outside of advertising is practically nothing.

"2nd—The jobber can and does pack tools for shipment along with many other items of which the manufacturer has never even heard. The packing and shipping charge is divided between several items and the item of tools is only a small proportion of the whole.

"3rd—We have no credit losses.

"These three items about cover the economic side of this proposition. Call the jobber a necessary evil if you wish, but the fact still remains that we could not market our tools, in my opinion, to the ultimate consumer were it not for this very same jobber who minimizes our selling costs and takes all our credit risks.

"When I make this statement, I recall to mind the case of a prominent electrical manufacturing concern which was organized to manufacture a certain line of switches and electrical specialties—now sold extensively through the jobbers.

"At the outset this electrical concern felt that it could, by eliminating the jobber, more advantageously market its goods to the user. It failed to see how the jobber, who neither made the goods nor used them, had a right to exist on the products of others.

"Just about the time that the factory began to sell its product direct to the consumer it found to its great dismay that its

marketing conclusion had been wrong. After interviewing several jobbers on the subject it learned the several facts which have since made this same concern a power in the industry.

"For instance, it was found that the jobbers were in business to sell goods; that the jobbers made no goods whatever; did not know how to make goods; nor did they want to know; that they devoted their entire energies to the sale of merchandise. They found that the jobber had made a study of and had built up an organization based on many years of experience; that the concern which devoted its time to minimizing the troubles and expense of selling goods, had not time to cope with the problems incidental to their manufacture and that the factory which has succeeded in manufacturing an article successfully and economically has solved all the difficulties it should be troubled with and that it is more profitable to leave the marketing of that article to concerns which know how to market it better than the manufacturer ever will.

"The company referred to learned that by marketing its product through the jobber it would not cost them one penny for anything they did not sell and that it would cost them only a very small percentage of the price on what was sold.

"Had that company properly considered in the beginning what it was going to cost it to market its product direct—as it had contemplated—it would have known that it would need an army of salesmen which would cost in salaries alone an amount that would be appalling, to say nothing of other incidental expenses, all of which would have to come out of the sales of the one line alone. And not only that, the expense would be on what it did not sell as well as on what it did sell.

"All these things were learned by bitter experience and this company has so revised its selling methods as to eliminate all of these troublesome items and turn the practical end of the marketing of its product over to highly trained and expert sales organizations maintained by the legitimate electrical jobber and in this way it has been enabled to dispose of its product to the ultimate consumer at a far less price than had it continued its original method of selling direct.

"I do not know of a better illustration of the fact that the middleman or jobber is an economic necessity, especially in the electrical supply business.

"But putting aside all questions of an economic nature and getting down to the fundamental reason for the jobbers' existence we come back to the one word 'service.' The jobber combs the country for standard electrical merchandise, buys it in the right market and maintains large stocks in his warehouses for immediate shipment to his customers and can, as a rule, deliver material to them in an average time of two days. That's what counts in these 'high pressure' days."

THE VALUE OF GUARANTEES.

By H. N. Gilbert.

The question of guarantees on manufactured products is one that has been discussed for years. We are inclined to laugh when guarantees are mentioned in connection with some things. This condition of affairs has been brought about by the extravagant claims made by some concerns in the past. Many of these guarantees were given and are given with no intention or expectation of living up to them. In this connection at least the concerns giving such guarantees are morally on the level with the green goods man who sells the Masonic Temple to our cousin from the country for a few hundred dollars.

This guarantee question is an important one that should be considered very seriously by manufacturers and users. If a manufacturer is honest in his attempt to manufacture a piece of apparatus to be of good service to the user, it is perfectly proper that he should make a reasonable guarantee as to the apparatus and its performance. It is hard for the buyer to look at a piece of apparatus and tell just how it will perform or whether there are some defects in the materials or workmanship. The manufacturer has control over these points with the possible exception of defective castings, etc., and he can afford to guarantee his apparatus to the user.

The manufacturer should give a great deal of thought to the wording of his guarantee. It should not be a comparatively meaningless mixture of high-sounding words which in the last analysis say nothing definite, nor should it guarantee a long list of things which it would be impossible to fulfill or which the manufacturer has no intention of living up to. It should be plain and simple so that it is not misleading as to its real meaning and yet should be so worded that the manufacturer cannot be imposed upon by some unscrupulous user. It must give the user facts and not convey the idea that he can get repairs free on a piece of apparatus damaged by neglect.

The National Gas Engine Association, made up of the leading gas-engine men in the country, is considering the following guarantee which was presented to it at its last meeting by its Standardization Committee:

"We hereby agree to supply new parts in place of any part of this engine which is proven to be defective in material or workmanship provided that such defective part be returned to us, transportation charges prepaid, within one year from date of shipment, ordinary wear and tear excepted.

"(A) We hereby guarantee that this engine will develop its rated horsepower at its rated speed at sea level.

"(B) We further guarantee that this engine has developed its full rated horsepower at its rated speed in our testing room."

The Electric Power Club, made up of 35 leading manufacturers of electric motors, generators, transformers, and industrial-control apparatus, has gotten up several guarantees in the years of its existence. At last meeting, the Electric Power Club adopted the following guarantee:

"The manufacturer guarantees that apparatus manufactured by him will deliver successfully its rated output as marked on the nameplate, provided said apparatus is kept in proper condition and operated under normal conditions with competent supervision.

"The manufacturer agrees to correct and shall have the right to correct by repair or replacement at his own expense (at his option f. o. b. his works) any defects in said apparatus which may develop under normal and proper use within six months after date of shipment where inspection proves the claim, provided the purchaser gives the manufacturer immediate written notice of such defects and provided further that during said period said apparatus is kept in proper condition and operated under normal conditions with competent supervision. The correction of such defects by repair or replacement by the manufacturer shall constitute a fulfillment of all his obligations to the purchaser.

"Where apparatus is purchased and resold the maximum guarantee period shall be 12 months from date of shipment from the manufacturer's works.

"The manufacturer shall not be responsible for any defects resulting from improper storage or handling prior to placing the apparatus in service, and the manufacturer shall not assume any expense or liability for repairs made outside his works, without his written consent.

"The manufacturer shall in no case be liable for consequential damages for any failure to meet the conditions of any guarantee."

This is a very well worded guarantee and bears evidence of a great deal of thought. It is fair to the user and gives him the protection to which he is entitled and on the other hand it works no injustice to the manufacturer. Manufacturers of other electrical products can afford to consider this subject and word their guarantees in as satisfactory a manner.

National Association of Electrical Inspectors.

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"LET THE CODE DECIDE."

Secretary's Message.

The Secretary has received the following letter, which may be of interest to our members, and though he has not had time to consult with the other officers, it seems not improper to print it here—it being, of course, understood that the association takes no stand upon the advantages or disadvantages of *any* particular device—that is the province of the Laboratories, and the "List of Approved Fittings" is our standard of reference.

GENERAL ELECTRIC COMPANY.
Schenectady, N. Y., February 19, 1916.

Mr. William L. Smith,
Secretary of the National Association of Electrical Inspectors,
Concord, Mass.

Dear Sir:

On page 252 of the February 5 issue of the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN are some answers by the inspectors to question No. 317, as to the best practice in fireproofing rubber-covered wire for use on the back of switchboards, as referred to under Rule 3*e*.

Our experience in securing the Underwriters' Laboratories' approval of satisfactory flame-proof or slow-burning wires for switchboard service, with insulation equivalent to rubber, would indicate that the combination of rubber and asbestos cannot be made to meet the test requirements of the Laboratories, for the reason that when the rubber is subjected to the Bunsen flame for 15 seconds, the gases readily pass through the meshes of the asbestos hose or tape and readily ignite and act like a gas burner and will continue to burn as long as the vaporized rubber-gas is produced by the heat. This has prompted us to use varnished cambric instead of rubber with a satisfactory fireproof treatment of the outer braid. This has met the severe test of the Laboratories and has received approval, and is listed in the list of Approved Fittings under flame-proof wires for switchboard service, page 148.

I mentioned this because it may be of interest to the members of the Association to know that rubber-covered wires with asbestos braid or tape would fail to met the Laboratories' test for a flame-proof wire for switchboard service as required under Rule 3*e*.

Yours very truly,

H. R. Sargent,
per F. A. Barron.

The matter appearing in this section consists of questions on the National Electrical Code, its interpretation and meaning, and questions as to whether certain methods of wiring are in accord therewith. These questions are gladly received from anyone interested, even if not a member; they should be sent to the secretary with any needed elucidating sketch. They are answered by each member of the Executive Committee according to his knowledge of what the ruling would be in his jurisdiction.

It should be understood that no pretense is made to give an authoritative interpretation of the Code. This is a voluntary association; it has representation on the Electrical Committee of the National Fire Protection Association, which prepares the Code, but it has no right, and claims no right, to give a final interpretation of anything in the Code. It is only intended to give the interpretation which seems correct to the members of the Executive Committee. No attempt is made to edit or correlate the answers from the different members of the Committee, as it is felt that the occasional difference of opinion is calculated to lead to a further study of the matter in question, further discussion and the final clearing up of obscure points.

The aim is to help toward a better understanding of the Code on the part of all; a more uniform conception of its meaning; increased precision in applying it; and harmonious action of those using it, for the common good.

Circuit-Breakers or Switch.

Question 318. In a two-phase, five-wire system, grounded neutral common to both phases, would it be permissible to use circuit-breakers in place of service switch, the breakers disconnecting the four phase wires but leaving the neutral unbroken?

Answer 1(P).* I find nothing in the Code to prohibit this.

Answer 2(S).* No. See Rules 19*a* and 23*a*. The switch should cut off all wires, neutral included.

Answer 3(B).* Any device approved as a severe switch should open all wires.

Answer 4(F and G). The use of circuit-breakers in lieu of service fuses is somewhat unusual but there is no objection to their use for this purpose. We would require them however to open all poles according to Rule 23*a*: "Cutouts must be placed on all service wires either overhead or underground in the nearest accessible place to the point where they enter the building and inside the walls, and arranged to cut off the entire current from the building. Departure from this rule may be authorized only under special permission in writing."

Answer 5(R).*. If it is to replace the switch *only* I would say, Yes.

Answer 6(E). Under the conditions expressed in the above question it is permissible to use the circuit-breakers instead of fuses and switch, but the circuit-breakers should open all the wires *as a switch*. While Rule 23*a*, third paragraph, states that automatic cutouts must not be placed in any permanently grounded service wires, it is equally true that Rule 24*a* requires that switches must be placed in all service wires. A circuit-breaker is both cutout and switch and in consideration of the requirements for the grounding of low-potential secondaries it was felt that the fuse might be safely omitted, but that the switch should be retained. Our department would approve of the use of circuit-breakers on the service wires provided all the wires were treated alike.

Answer 7(O). It would not be permissible to use circuit-breakers in place of service switch if any wire of the service is not disconnected.

According to Rule 19*a* all the wires of the service, including the grounded neutrals, must be opened by the switch, but these grounded neutrals must not be opened by the automatic cutout provided.

Answer 8(T). No. As rules state that switches must disconnect all wires I should interpret this as applying in this case and require that the switch disconnect neutral line although grounded. Rule 19*a*.

Answer 9(D). We should say, Yes.

Answer 10(H).* No. Circuit-breakers do not fill the requirements.

Answer 11(N).* Rule 24*a* requires a service switch in all wires of the service.

Rule 23*a* forbids a cutout in a permanently grounded neutral.

Rule 19*a*, second paragraph: " . . . in four-wire three-phase circuits, there must be a trip coil in each phase. If a circuit-breaker is also used in place of the switch it must be so arranged that no one pole can be opened manually without disconnecting all the wires." No distinction between services or elsewhere.

The arrangement of the circuits in the question is exactly analogous to the above, it being in fact a quarter-phase star or better, equal-armed 90-degrees cross, while the rule refers to the three-phase star.

My reply then would be: "Yes, according to the rules of the Code, you may use the circuit-breakers; but you must have them so connected that overload in any one of the phase wires will trip the breaker in that wire alone leaving all the others intact, but so interconnected with an additional breaking device in the grounded neutral that it shall be impossible to open any one of the five wires by hand without the other four opening automatically and simultaneously."

Crane Wiring.

Question 319. In putting in control wires for an electric crane is it necessary to insert turnbuckle at the ends of the runs? What is the best way of insulating these wires from the crane girder?

Answer 1(E). It is not necessary under the Code rules to insert turnbuckles on control wires of an electric crane. These wires may be in conduit or on knobs or insulators, keeping them at least one inch from surface wired over. The *collector* wires should have a turnbuckle at each end.

Answer 2(R.).* No, but it is good practice. A good method is to have the contactor arranged to lift these wires, as the crane travels along, a sufficient distance above the girder.

Answer 3(U). No, but it is good practice; strain insulators at ends of lines and porcelain-covered hooks to take up sag.

Answer 4(S).* See Rule 43*a;* collector wires must be held at ends by strain insulators. Control wires do not require such supports. When control wires are exposed on open work, cleats, knobs, etc., flexible tubing may be used, depending on conditions.

Answer 5(F and G). Turnbuckles are not absolutely necessary but are useful to take up the slack in the wire. Ordinary strain insulators are satisfactory at the ends.

Answer 6(A).* Not having any electric cranes in this section I cannot offer any suggestions.

Answer 7(O). Assuming that the "control wires" in this question are the same as "bridge collector wires" in Rule 43*a*4, I should judge that they are not necessary, but are usually used. The wires may be insulated from the crane metal in numerous ways. The Code does not restrict the crane manufacturer to any particular mechanical construction.

Answer 8(T). I am without sufficient information on this.

Answer 9(M). It is not necessary, provided supports are interposed so as to support wires properly and relieve strain.

Answer 10(N).* Not on control wires—advisable on collector wires. *Method* of insulating is hardly a Code matter, but rather one of engineering practice.

Some Thoughts Suggested by Question 318.

This question, referring to service protection on a quarter-phase five-wire star system, is very interesting because of the peculiarities of some possible combinations which may occur.

Originally there seemed quite a possibility of competition between the various polyphase systems and numerous combinations were tried out, among them for instance the monocyclic.

They soon were all boiled down to the three-phase star and mesh, the two-phase with four separate wires, two per phase, and the two-phase with three wires, one being common to each phase. This latter was for a while in competition with the three-phase star, but it was subject to the difficulty that while the three leg currents in the three-phase star were equal under balanced load, the current in the common return of the other system was 141 per cent of that in either phase leg. This made a greater drop in the return wire than in the others, distorted the voltages and generally messed up all ideas of symmetry.

In the meantime, it having been found impossible to operate a three-phase with both motor and lamp load without changes on one phase causing disturbances on the other two, the four-wire three-phase system—a star with a neutral brought from the center, so that lamps might be operated at leg voltage single-phase from line to neutral and motors three-phase at 1.72 times leg voltage between the line wires—was worked out.

This system (taking as 100 per cent the copper used in a two-wire single-phase system) requires for equivalent power at equal loss and minimum potential 29.17 per cent copper.

To meet this, the quarter-phase five-wire star, on which lamps might be run on four practically independent lines to neutral equal-voltage circuits, and quarter-phase motors on the four lines at 1.42 times leg voltage, was developed.

This system on the same basis of comparison as above requires 28.125 per cent copper.

This combination might be obtained from two single-phase generators with their armatures rigidly fastened 90 electrical degrees apart, that is in quadrature, the midpoint of each armature connected (as may be accomplished in various ways) to a common "neutral" bus; or a single machine, with a four-legged star winding and fifth collector ring tapped on at the center, may be used.

There were some of these machines put out, but I do not think very many; personally I never saw one except in a laboratory where it was very handy, giving us 100 volts either line to neutral, 200 volts between opposite lines, or 142 volts between two adjacent lines.

In order to show what curious combinations may be obtained with such circuits, I will describe the following. A machine being available with special leads brought out to make possible different experimental combinations, it was connected up as a two-phase three-wire induction motor, and as such had a rating of 10 kilowatts.

A five-wire quarter-phase star generator was arranged and from this was run out a five-wire circuit arranged to equal a 500-foot run of No. 2 wire. The resistance of each line was $r=0.08$ ohm, and inductive reactance $x=0.05$ ohm, so that the impedance $z=\sqrt{r^2+x^2}=0.094$.

The leg voltage was adjusted for approximately 115 volts line to neutral, and as shown in the diagram, Fig. 1, the motor was connected between phases A and B and the neutral.

It was loaded to 7.5 kilowatts and then ran with a power-factor of 0.8, efficiency of 82 per cent; under these conditions each phase current was 50 amperes, the power component being

40 amperes and the wattless component 30 amperes.

Calling the line of reference the electromotive force of phase A at the receiving end, the electromotive forces were

$$E_A=115+j0 \quad E_B=0+j115.$$

The currents were

$$I_A=40-j30 \quad I_B=30+j40.$$

Angle of $I_A=-37°$, angle of $E_A=0°$.

Angle of $I_B=53°$, angle of $E_B=90°$.

Phases C and D were now each given a noninductive load of 50 amperes, so the electromotive forces were

$$E_C=-115+j0 \quad E_D=0-j115$$

and currents

$$I_C=-50+j0 \quad I_D=0-j50.$$

Angle of $I_C=180°$, angle of $E_C=180°$.

Angle of $I_D=270°$, angle of $E_D=270°$.

$$Z_A=Z_B=Z_C=Z_D=r-jx=0.08-j0.05.$$

Under these conditions the current in the neutral was

$$I_N=-20+j40 \quad i_n=44.7 \text{ amperes at angle } 116°30'.$$

The corresponding voltages at the generating end were relatively

$$V_A=116.7-j4.4, \text{ angle}=-13', \ v_a=116.8$$
$$V_B=4.4-j116.7, \text{ angle}=89°47', \ v_b=116.8$$
$$V_C=-119+j2.5, \text{ angle}=179°50', \ v_c=119$$
$$V_D=-2.5-j119, \text{ angle}=268°50', \ v_d=119.$$

This gives a distortion of the neutral so that if it be assumed to remain symmetrically situated at the receiver end, at the generator end its potential is off center at an angle of 264°30′ by $V_N=-0.4-j4.2$. The various line drops in numerical values were:

Line A=1.8 volts, Line B=1.8 volts, Line C=4 volts, Line D=4 volts, Neutral=4.22 volts.

Check on neutral drop $i_n z=44.6\times0.094=4.19$ volts.

Without going into details in each case, let us see what happens when the four lines are opened in turn.

First, suppose we open phase D. The neutral current then becomes 22.6 amperes at an angle 206°30′, the drops are in A, 1.8 volts; in B, 1.8 volts; in C, 4 volts; but in the neutral it becomes 2.11 volts and it is thrown off center in another direction.

Second, suppose we open phase C instead of D. The neutral current then becomes 80.6 amperes at an angle 150°30′, the drops in A and B are as before; in the neutral it becomes 7.6 volts and it is thrown off center in a third direction.

This accounts for the two noninductive phases, but before examining the inductive phases we must note how the motor acts.

When the motor has one of its phases opened, it runs as a single-phase induction motor, but its rating is now about 7 kilowatts instead of 10 kilowatts. It is therefore fully loaded or even a bit more, its efficiency is a little better, and since it now takes double the magnetizing current in the phase that is left, its power-factor is changed somewhat.

Third, if then we open phase B we find that the current in phase A, which before was 50 amperes at —37°, now becomes 96 amperes at —38°. The line drops are, in A, 3.3 volts; in C, 4 volts; in D, 4 volts; and in the neutral, 10.3 volts; while the neutral current becomes 113 amperes at an angle of 103°.

Fourth, if we open phase A instead of B, we find that the current in B, which was originally 50 amperes at 53°, becomes

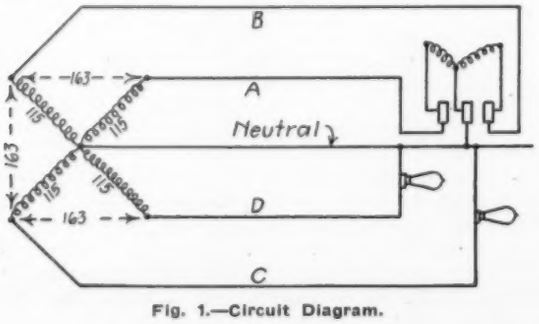


Fig. 1.—Circuit Diagram.

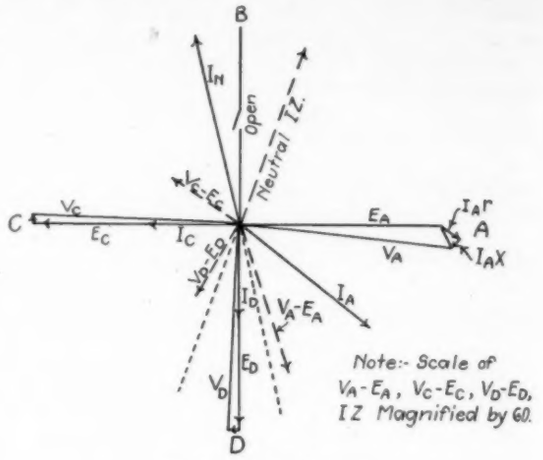


Fig. 2.—Vector Diagram.

96 amperes at 52°. The line drops are, in B, 3.3 volts; in C, 4 volts; in D, 4 volts; and in the neutral, 2.5 volts; while the neutral current is now 26.6 amperes and the phase angle 248°.

Fifth, if C and D are opened together, the neutral current is 71 amperes at 188°; the neutral drop 6.74; while if A and B are opened together, the current is still 71 amperes, but at an angle of 45°, and the drop again 6.74 volts.

Fig. 2 shows the vector diagram for case 3 above. Thus we see that in this case the neutral current assumed successively values

22.6 amperes, phase angle 206.5°
22.6 amperes, phase angle 248.0°
44.6 amperes, phase angle 116.5°
71.0 amperes, phase angle 188.0° or 45°
80.6 amperes, phase angle 150.5°
113.0 amperes, phase angle 103.0°.

When the heaviest load was on, the neutral current was 44.6; and in some of the other cases the total load on the generator was reduced, while the range of neutral I^2R is from 41 to 1,021 watts.

Of course it is hardly to be supposed that an exact parallel of this case would arise in practice, though it is perfectly *possible*, but it does illustrate the nature of the possible combinations that might arise, and it shows very clearly the importance of the requirements of Rule 19 of the Code. It would be very bad if one of these phase wires in opening automatically carried the neutral with it as in some of the cases the disturbance of the portion of the system left alive would be extreme, to say the least, and it would also be exceedingly bad to allow of opening the neutral by hand without also opening all the other lines at the same time, the same being obviously true of any of the lines, so that the wording of Rule 19*a*, second paragraph, is none too strong.

For though it is unlikely that such a motor and lamp combination would ever be found, nevertheless cases of noninductive loads on some phases combined with inductive loads on others might easily be found and this problem is at least interesting.

W. L. Smith.

New Aluminum Plant for Norway.

An extensive aluminum smelter is being organized at Höyanfjord, Norway, where there is a waterfall which may furnish 60,000 horsepower. It is proposed to develop 20,000 horsepower at once, to provide for the production of 4,000 tons of aluminum per year. The capital stock of the company is fixed at $3,350,000, of which $2,680,000 is subscribed. The banks of Christiania and Bergen have declared a willingness to underwrite a loan of $1,000,000 for the company.

A number of bauxite beds have been secured in southern France, where the ore will be worked into oxides and shipped in this concentrated form to Norway.

NEW APPLIANCES

A Weekly Review of the Latest Developments and Current Information Respecting Electrical and Kindred Mechanical Appliances

Compact High-Frequency Generator for Electrotherapeutics.

Physicians have been using high-frequency currents for many years, and have accomplished wonderful results in nearly all cases of scalp and skin diseases, and in cases where body treatments are necessary. The only drawback heretofore has been that the machines have been so expensive that the doctor was compelled to charge from $3 to $5 for each treatment. An advance in application of high-frequency currents has been made through advent of the Violetta high-frequency generator, a modern scientific instrument, which, it is claimed, does all the work of the bulky old-type machines and eliminates the objectionable features thereof. The compact construction of the Violetta equipment, its simplicity of operation, and its safety makes the high-frequency current now possible for private use in the home.

This instrument is self-contained and is inclosed in a polished hard-rubber casing. Its weight is only 1.5 pounds and with its various electrodes is packed in a neat and handy carrying case. The outfit can be used on either direct-current or alternating-current circuits, and takes only a small fraction of an ampere to energize it. By means of a small button the treatment can be easily adjusted to be mild, medium or as strong as desired. The instrument here shown is constructed to meet the requirements not only of the medical profession, but also of the private individual for use in the home.

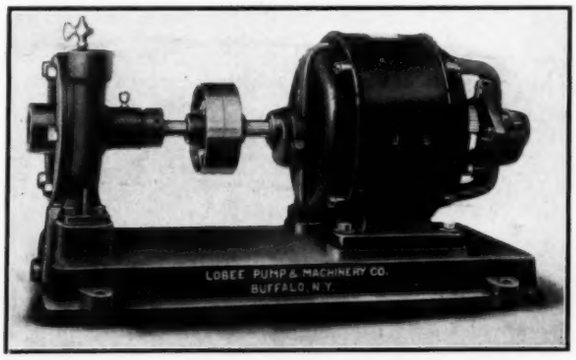
The current set up by the Violetta apparatus produces a minute cellular massage, which is more penetrating and more beneficial than the muscular massage produced by

Violetta High-Frequency Set.

mechanical vibration. It furnishes its supply of electricity in a most pleasant form, as the high-frequency current causes no muscular contraction or unpleasant sensations of any sort. It is really a luxurious electric treatment. The Manufacturer, Bleadon-Dunn Company, 208 North Fifth Avenue, Chicago, Ill., furnishes with each instrument a booklet on the subject of high frequency. This booklet takes up its uses in a concise and simple style devoid of technical phrases, so as to be readily understood by the layman. This instrument opens up an entirely new and profitable field for the electrical dealer, jobber and central station.

The Lobee Motor-Driven Centrifugal Pump.

The compact centrifugal pumping outfit shown in the accompanying illustration is manufactured by the Lobee Pump & Machinery Company, Buffalo, N. Y. This is a small iron centrifugal pump fitted with bronze runners to resist the



Electrically Driven Centrifugal Pump.

chemical action of the water. It has 1.5-inch suction inlet and 1-inch discharge outlet. Its capacity is 25 gallons per minute against a head of 35 feet. For driving the pump at this load a Westinghouse one-horsepower motor is used. The pump is also built for heads up to 90 feet, but of course in such cases requires correspondingly larger motors.

This pump is designed for use in buildings where the pressure is low or for the circulation of brine in coolers, and for other purposes of a similar nature.

New Lighting Unit for Gas-Filled Lamps.

The very high efficiency obtained by the use of gas-filled tungsten lamps is bringing about their rapidly increasing use for industrial and commercial interior installations. Since the filaments of these lamps are of quite concentrated construction and of very high intrinsic brilliancy, it is necessary to surround them with effective diffusing shades or globes. At the same time it is desirable to provide over the lamp a reflector which will throw downward into useful directions most of the rays that would otherwise be wasted on the ceiling or upper parts of the walls.

The requirements of such a unit have been incorporated in the design of a new lighting fixture recently placed on the market by the Beardslee Chandelier Manufacturing Company, 216 South Jefferson Street, Chicago. The general arrangement of this unit is shown in Fig. 1, which is a night view of the outfit taken by its own light, to give an idea of its appearance in actual service. The interior construction is made clear from Fig. 2. It will be

Fig. 1.—Night View of Denzar Unit.

observed that a metal housing covers the entire socket, which is of mogul size to accommodate large gas-filled lamps. Beneath this housing is a metal holder for the upper glass reflector and the glass diffusing globe. Secured to this holder is a spring support that holds a porcelain deflector, which is immediately above the neck of the lamp and is arranged to reflect light that would be otherwise wasted in the upward direction. The upper or reflecting dome is made of opal glass, which throws the bulk of the light downward, but permits enough light to fall upon the ceiling to remove the gloomy aspect thereof that is noticeable where opaque reflectors are used. The surrounding globe or shade is of special design; it is a continuous glass envelop, the upper concave portion of which is of clear glass, whereas the lower, or convex portion, is finished with a polished enamel coating that conceals the lamp filament and effectively diffuses the brilliant rays. The relative arrangement of the two globes is shown in Fig. 2, which also makes clear the fact that no portion of the filament itself can be seen. In the bottom globe or shade is an opening that serves as an air intake for ventilation. Outlets for the heated air are provided in the upper part of the unit.

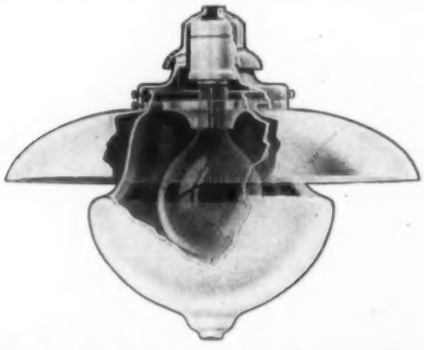


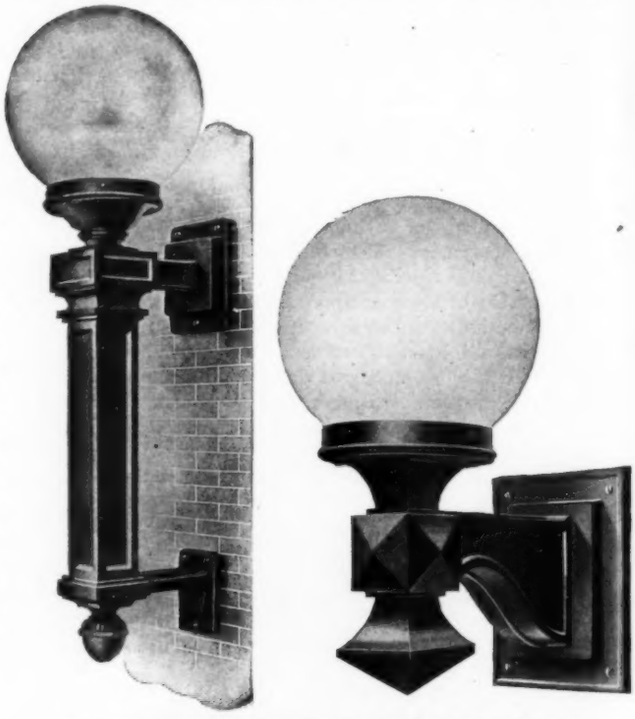
Fig. 2.—Partial Section of Denzar Unit, Showing Construction.

This unit is free from any metal supporting rods and is very easily kept clean. When lighted it has a uniform appearance in all parts. This unit is sold under the trade name "Denzar." It is made in two sizes, of which the larger has a reflector diameter of 20 inches and accommodates either 400 or 500-watt lamps. The smaller unit has a diameter of 17 inches and is arranged for 200 or 300-watt lamps.

Ornamental Brackets for Use at Doorways of Public Buildings.

At the entrances to public buildings, as well as private structures of imposing character, such as schools, hotels, club houses and other institutions in which the architect has been given considerable freedom in design, it has been regarded as being very appropriate to install ornamental lighting brackets of a design to harmonize with the architecture of the building. The design and manufacture of such equipment, as well as other fixtures for outdoor lighting, has for some time been made a specialty by the Herwig Art Shade & Lamp Company, 2140 North Halsted Street, Chicago. The firm manufactures a very large assortment of ornamental brackets of all kinds, pillar and pedestal lamps, lanterns, etc.

In the accompanying illustrations are shown two recent designs of brackets, of which Fig. 1 shows a pattern with an upright portion three inches square. The entire height



Figs. 1 and 2.—Ornamental Brackets for Building Entrances.

of the fixture to the top of the holder is 28 inches. The center of the lamp is brought 7.5 inches from the wall. Another design shown in Fig. 2 brings the center of the lamp 10.5 inches from the wall. The height of this fixture to the top of the globe holder is 10.75 inches. In each of these brackets a six-inch holder is provided for the globe.

Brackets of this and a great many other designs made in durable metal are being used extensively at the entrances to school buildings, telephone exchanges, power houses and substations, fire headquarters and police stations, etc. The design of the brackets is simple and yet heavy and substantial to be in keeping with the architectural design of the building.

This company has recently also secured patent rights for the Ventilite fixture, which is intended for exterior lighting with gas-filled tungsten lamps, and is particularly suitable for the lighting of yards, station platforms, etc.

Fig. 3.—Ventilite Outdoor Fixture.

This fixture is characterized by its specially good ventilating properties. Three sets of ventilating passages are provided in the upper portion of the fixture, which supply liberal cooling for the lamp itself and for the socket. This fixture is built on the unit principle, permitting interchange of detail parts without the necessity of rewiring the entire outfit. Although not yet on the market for a very long time, it has come into extensive use on account of its merits.

These fixtures are made of durable, weatherproof construction suitable for store and theater fronts, and all other outdoor purposes. They also are excellent for indoor use by industrial plants, etc. They can be suspended by chain, stem or conduit, cable, bracket or gooseneck, as conditions require.

Retherford Electric Fixtures.

There has been noticeable in recent years a marked tendency to avoid stereotyped designs in lighting fixtures and particularly such as suggest former models of gas chandeliers. This has imposed on fixture designers and manufacturers the necessity for continually bringing out new designs. A fixture manufacturer that has been devoting much attention to this is the Retherford Brothers Company, of Muncie, Ind. In a recent catalog issued by this firm there are over 230 plates, each of which averages four or more fixtures, thus making an especially large assortment from which almost any desired selection can be obtained.

It is impossible to give in the limited space available much of an idea of the wide range of these designs. Only a few taken at random are illustrated herewith. The one shown in Fig. 1 is a combined semi-indirect and direct fixture which is made with four pendent lamps and a large central Thorion glass paneled bowl. The spread of this fixture is 26 inches and its length 36 inches. This fixture is particularly suitable for use in dining rooms, replacing the domes that formerly were much in vogue, but which were found unsatisfactory in many respects This fixture is also made without pendent lamps and in another form with upright candle-resembling lamps in place of the pendents.

A semi-indirect fixture with hand-decorated floral bowl, is shown in Fig. 2. This bowl is of very attractive design and is 10 inches in diameter and 7 inches deep. The entire length of the fixture to the bottom of the bowl is 30 inches. The bowl-supporting ring is of attractive finished metal.

A pleasing shower fixture shown in Fig. 3, includes five pendent lamps suspended from an ornamental plate. The diameter of the latter is 16 inches and the total length of the fixture 36 inches. This design avoids the objection felt in the minds of some against shower fixtures with individual long chains. The socket enclosures harmonize with the design of the plate and canopy.

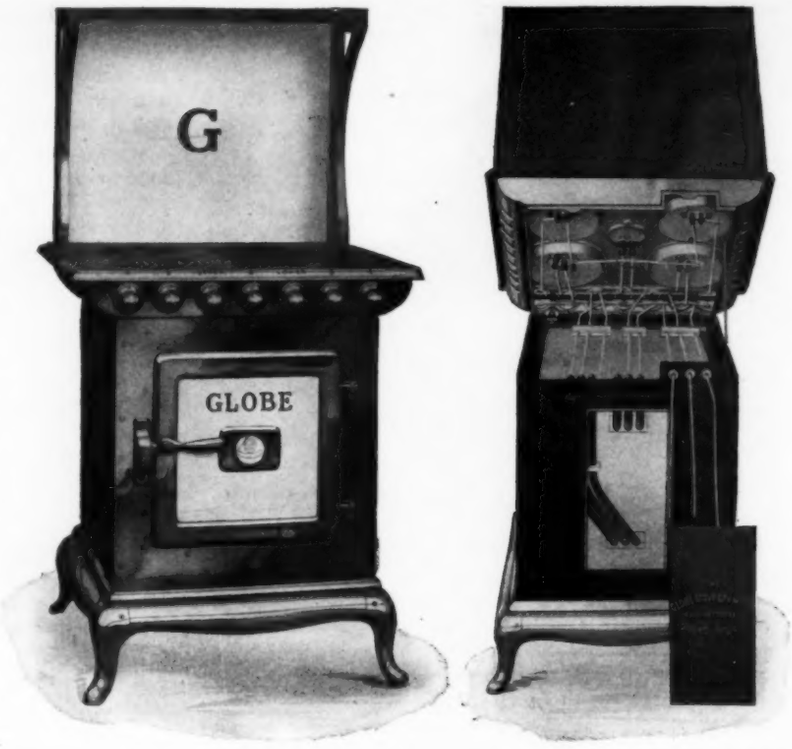
Figs. 1, 2 and 3.—Three Typical Designs of Fixtures Made by the Retherford Brothers Company.

Electric Range with Readily Accessible Wiring.

An electric stove with a completely accessible wiring system has recently been placed on the market by the Globe Stove & Range Company, Kokomo, Ind. Two different models are manufactured, the accompanying cuts showing both front and rear views of the B-1 type.

To insure absolute ease of inspection and repair, the top of this Globe Electric has been hinged just above the oven door. When the top is raised the entire wiring system of the top of the stove is exposed to view. Every unit and terminal may be easily reached. The removal of the metal plate in the back of the range renders accessible the terminals of both the upper and lower oven heating units.

In construction this model is probably one of the most simple and at the same time effective electric stoves on the market today. Although it is built up to the Globe company's high standards of construction, which make the need for repairs very remote, it has been thought desirable to arrange the wiring for instant inspection, so that should at any time such a need arise, due to misuse, no time will be lost in locating and getting at the trouble.



Front and Rear Views of Globe Electric Range, Showing Ready Accessibility of All Wiring.

Ownle Telephone Holders.

The manufacturing and sales rights of the Ownle line of telephone holders, formerly made by the Ownle Manufacturing Company, of Camden, N. J., and which were invented by William B. Oliver, have been secured by the K. & B. Company, which is moving the plant to its Philadelphia address, 25 North Seventh Street. By adding these types, known as the "As-You-Like-It," "Phonopoise" and "Projecto" holders, to its own formerly very extensive line, the K. & B. Company presents to the trade what is said to be the most comprehensive assortment of telephone holders and accessories on the market.

This line of equipment has been developed as the result of 25 years' experience. The K. & B. Company long ago realized that no one type of telephone holder would meet a universal demand, and in presenting all types, it enables the trade to secure business from every prospect, whereas if only one type were offered, an order would often be lost. The large sale of this material enables the manufacturer to offer an interesting line of discounts to the trade.

In the accompanying illustrations Fig. 1 shows the "As-You-Like-It" holder, which as its name implies, permits the telephone to be put in any desirable position. Three positions are shown, also the path of movement of the instrument. The "Phonopoise," Fig. 2, swings up or down, all the time remaining perfectly balanced. In Fig. 3 the "Projecto" is shown in two positions; it moves the instrument in a horizontal plane. All these holders also swivel at their point of attachment and are made for one or two telephones.

Figs. 1, 2 and 3.—Three Types of Ownle Telephone Holders in Various Positions of Adjustability.

A New Type of Frequency Meter.

A frequency meter based upon a new principle has been put on the market by Siemens and Halske, Berlin, Germany. It utilizes the fact that the effective resistance of an iron wire depends upon the frequency. By sending a definite current through a coil of such wire the difference of potential at its terminals becomes a measure of the frequency, and it may be read upon a voltmeter graduated in cycles per second. The instrument is calibrated for a circuit of definite voltage, and used in series with a compensating resistance, so that fluctuations of voltage will not vitiate the readings. The compensating resistance is similar to the ballast resistance of a Nernst lamp.

INDUSTRY ACTIVITIES

The Electric Storage Battery Company, Philadelphia, Pa., has issued the fourth number of its house organ, "The Booster."

The Ohio Brass Company's Bulletin for January-February contains two interesting articles, one on gas-weld bonding and another on trolley systems for coal-mine service.

The National Conduit & Cable Company, New York, N. Y., has issued a folder called "Copper Gossip," which gives a brief review of the conditions in the present copper market.

Magnetic Manufacturing Company, Milwaukee, Wis., has issued Bulletin No. 5, which describes its line of electromagnetically operated vibrators for foundry use. Price lists are also included.

The Railway & Industrial Engineering Company, Pittsburgh, Pa., has issued a neat folder which gives illustrations showing a number of installations of Burke horn-gap switching and protective apparatus.

The Kentucky Light & Power Company, Hartford, Ky., has contracted with the Ridgeway Engine Company and the Allis-Chalmers Company for a 125-horsepower engine and generator. The contract calls for installation in 45 days.

The Nashville Machine Company has purchased the business and equipment of the Atlas Machine Company, of Nashville, Tenn., at a reported consideration of $80,000. Both concerns manufacture electric elevators and other electrical equipment.

W. R. Ostrander & Company, New York, N. Y., is distributing a folder describing a wireless battery cabinet recently placed on the market. The company has also prepared a folder describing its line of sun ray reflectors for store-window lighting.

Pass & Seymour, Inc., Solvay, N. Y., manufacturers of electrical wiring devices, have opened a branch office at 158 Purchase Street, Boston, Mass., George L. Hatheway being in charge. The New England and Canadian territory will be handled from the new office.

The Robbins & Myers Company, Springfield, O., has recently acquired the entire top floor of the Bushnell Building Annex, and has equipped it for club rooms for its employees. Every employee of the company is a member of the club, and no dues are charged. The illustrations show the billiard room and the auditorium. The latter is used for the monthly meetings of the club, for which prominent speakers are engaged and music and luncheon provided. The room is also at the disposal of the members for social gatherings, and is used by the 24-piece band maintained by the company. A reading room, provided with all the latest magazines and technical publications and an electrically operated Victrola is a feature of the club rooms.

The Federal Telegraph Company, San Francisco, Cal., has leased from the city of Palo Alto a two-acre strip of land, and it is understood work is to begin immediately on the construction of a $10,000 factory building for the manufacture of electrical equipment.

Westinghouse, Church, Kerr & Company, New York City, has issued a neat folder, showing illustrations of recent concrete work done by the company. One of the illustrations shows a view of the Pennsylvania station, New York City, now in course of construction.

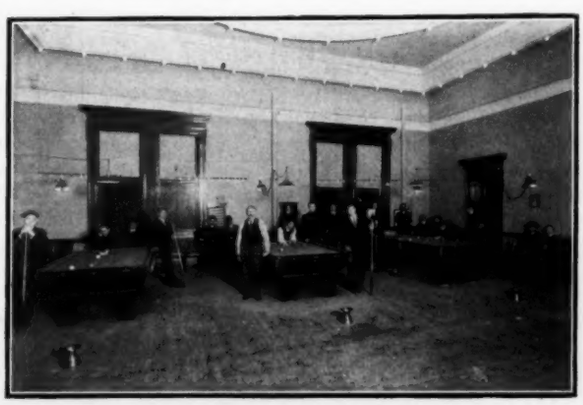
Hotpoint Electric Heating Company, Ontario, Cal., is issued a new discount sheet on its electrical-fitting specialice. These publications are issued monthly and valuable data on methods of merchandising and co-operation between dealers and manufacturers is presented.

Harvey Hubbell, Incorporated, Bridgeport, Conn., has issued a new discount sheet on its electrical fitting specialties and supplies. It gives the discount for the territories east and west of the Mississippi River and also net prices. Discounts are also given for various quantity purchases.

Rome Wire Company, Rome, N. Y., manufacturer of bare and insulated electric wires, has prepared a four-page folder entitled "Copper History," which gives the average price of copper for each month from 1885 to 1916. The company will furnish, free of charge, copies to anyone desiring them.

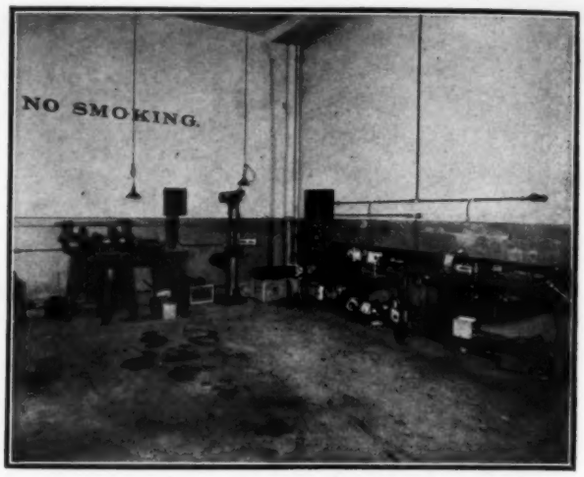
Westinghouse New York Automobile Service Station.—An instance of the recognition of service in connection with automobile accessories is to be found in the automobile service station maintained by the Westinghouse Electric & Manufacturing Company at 250 West Fifty-fourth Street, New York City, where cars equipped with Westinghouse ignition, lighting and starting apparatus are cared for. The company also maintains in the same city a repair shop and service station for general electrical machinery. Owing to the fact that the electrical and mechanical corps at the automobile station consists of men that have been trained at the Westinghouse works, the service rendered is especially rapid, and a surprisingly small amount of space suffices for

Auditorium, Robbins & Meyers Company Club Rooms.



Billiard Room, Robbins & Meyers Company Club Rooms.

Front View, Westinghouse Automobile Service Station, New York City.



Repair Shop, Westinghouse Automobile Service Station, New York City.

the necessary service for the district, which includes Greater New York and the territory that extends west as far as Syracuse. The shop equipment includes the necessary machine tools, a motor-generator battery charging outfit, an air compressor, and testing tables for determining the characteristics of engines, ignition, lighting and starting apparatus. A complete line of repair parts is on hand at all times, and lighting and starting equipment is for sale for attachment to used cars. A limited amount of high-grade lighting and starting installation is handled for the New York agents of several of the most important cars in the country. The sales-service station is under the management of S. D. Levings, assisted by G. E. Hanken; E. A. Cousins superintends the shop department.

Benjamin Electric Manufacturing Company, Chicago, Ill., has issued a 28-page "Handy Lighting Manual." The booklet gives general information on questions concerning illumination, tables and formulas. Illustrations and price lists of a number of Benjamin reflectors, fittings and fixtures are also included.

The Adapti Manufacturing Company, Cleveland, O., has prepared Bulletin No. 105-A, which is descriptive of the company's 700 line of condulet boxes. This line has been placed on the market to meet the demand for fittings adapted for use with 0.5 to 1-inch conduit in installations where the fittings must be of uniform size and design.

Chicago Mica Company, Valparaiso, Ind., makers of "Micabond" insulation, reports a constantly increasing demand for its products. This company makes quality mica product for electrical use, and numbers among its customers the largest users in the United States. The company is at present working night and day to keep up with the demand, and is making plans to increase its facilities, in order to take care of the increasing business.

Walker Vehicle Company, Chicago, Ill., has added to its 1916 line of Chicago electrics, two new models termed "Edison Models." These are four-passenger, rear-seat drives, of closed-car construction. The new body construction is low hung, presents conventional lines, all angles and sharp corners having given way to curved design. The company is offering to the purchasers of electric cars in Chicago the opportunity of adopting rental battery service by selling to those who desire this service 1916 models at a material reduction from the list price. By this policy the purchaser of the electric car can rent complete battery service at a minimum charge per month and need not stand the investment that is necessary when he purchases a battery with the car. Furthermore, the new rental service which is now offered in Chicago, by several battery concerns, covers the entire maintenance and repair expense incident to the hardest use that batteries can be given. It is believed that this new system will prove one of the greatest economy factors introduced for the user of electric cars, particularly to those desiring longest mileage. Indications are that in the near future this system will be available in all parts of the country to users of electric cars.

The Cutler-Hammer Manufacturing Company.—Arthur Simon, of the engineering department, gave a talk on magnetic solenoid apparatus before the Engineering Society of Milwaukee February 16, in which the characteristics of direct and alternating-current solenoids were discussed. The effect of "coneing the plunger" and peculiarities in design and construction were brought out. The talk was illustrated by numerous charts and samples of solenoid brakes, contactor-type switches and magnetic gear shift for automobiles, manufactured by his company. The talk was concluded with a 1,000-foot moving-picture reel which showed a Cutler-Hammer high duty lifting magnet at work at the plant of the Inland Steel Company, Indiana Harbor, Ind.

The General Electric Company, Schenectady, N. Y., has prepared a very interesting exhibit of its railway appliance products for the National Railway Appliances Association Convention to be held in the Coliseum, Chicago, Ill., March 20-23. The exhibit will include PenDell automatic substation equipment for maintaining a continuous supply of power on a transmission or service line when two or more sources of electric supply are available; a standard-section-type switchboard for electric garages, train lighting and baggage truck charging, and general battery charging purposes; vacuum-tube lightning arresters; a display of enameled resistance units; indoor and outdoor-type air-cooled transformers for low-voltage signal lighting and portable testing instruments.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received and signed a number of contracts since the New York Automobile Show. Among these are contracts for starting equipment for the Daniels Motor Car Company, Reading, Pa., and the H. A. Lozier Company. Contracts have been signed for distribution of Westinghouse equipment for Ford cars with the Motor Parts Company, in New England, New York and Easton Pa.; Shuler Rubber & Supply Company, New Orleans, La., in Louisiana and Southern Mississippi, and the Richardson Garage, Baltimore, Md., in Northwestern Maryland. S. F. Dupree, Jr., representative of the automobile equipment department, and in charge of Ford equipments, is now on an extended tour of the South and Middle West.

LATEST APPROVED FITTINGS

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association

CABINETS.—C. & P. Electric Works, 92 Hayden Street, Springfield, Mass.

Sheet-metal cabinets for switches, cutouts and panelboards, including type S cabinets for C. & P. barrier cutouts and panels.

Listed January 11, 1916.

CORD CONNECTORS, For Fuseless Attachment Plugs.—The Chelton Electric Company, 314 Armat Street, Philadelphia, Pa.

Catalog Nos. 1000 and 1001.

Listed February 1, 1916.

FITTINGS FOR CONDUIT BOXES, Supports.—Metal Specialties Company, 710 R. A. Long Building, Kansas City, Mo.

Stamped steel supports with holes for mounting screws, adapted to permit the adjusting and securing of outlet boxes at walls or ceilings.

Listed December 17, 1915.

FIXTURES.— Franks Manufacturing Company, 1524 Fourth Avenue, Rock Island, Ill.

This device is an adjustable fixture for mounting on sewing machines. The stem is threaded in a metal ball held by springs in a metal base and is adjustable in any direction within established limits.

Catalog Nos. 90, 94, 96.

Listed February 1, 1916.

FUSELESS ATTACHMENT PLUGS.—The Trumbull Electric Manufacturing Company, Plainville, Conn.

Separable attachment plugs, having porcelain or composition bases or caps. Trumbull, 660 watts, 250 volts, catalog No. 792.

Listed February 1, 1916.

FUSELESS ATTACHMENT PLUGS.—Weber Electric Company, Schenectady, N. Y.

Non-separable attachment plugs.

1 ampere, 250 volts; 3 amperes, 125 volts; catalog No. UF120, with switch rosette.

Listed February 3, 1916.

PANELBOARDS.—C. & P. Electric Works, 92 Hayden Street, Springfield, Mass.

Barrier panels made up of 2 and 3-wire main sectional plug-fuse cutout bases and end pieces and solid busbars. The bases have upturned edges to form a barrier around wiring gutter. C. & P. maximum capacity 40 circuits, 125 volts.

Listed January 12, 1916.

PANELBOARDS.—The Flint Electric & Manufacturing Company, 1400-12 Delgany Street, Denver, Colo.

Panelboards shown by tests and examinations conducted by Underwriters' Laboratories to be in accordance with requirements of the National Board of Fire Underwriters, and examined at factories and passed by Underwriters' Laboratories, have labels attached to each panelboard.

Listed January 18, 1916.

PICTURE MACHINES AND APPLIANCES.—Thomas A. Edison Inc., Orange, N. J.

Edison super-kinetoscope moving picture machine. Two types; one for hand operation, the other driven by a special motor and equipped with a mechanical speed controller and with an automatic device for stopping motor in event of breakage or of lack of tension on film.

Listed January 12, 1916.

RECEPTACLES, Candelabra and Miniature.—Weber Electric Company, Schenectady, N. Y.

Weber, 75 watts, 125 volts.

Candelabra. Cleat, catalog No. 2050.

Miniature, for decorative lighting systems, Christmas tree lighting outfits and similar purposes. For indoor use only. Cleat, catalog No. 2049.

Listed January 5, 1916.

RECEPTACLES, Standard. — The Adams-Bagnall Company, Cleveland, Ohio.

A. B. Keyless, porcelain shell. Fixture type, 660 watts, 250 volts, catalog No. 234.

Listed January 5, 1916.

ROSETTES, Fuseless.—Pass & Seymour Inc., Solvay, N. Y.

3 amperes, 250 volts, catalog No. 1999.

Listed January 5, 1916.

ROSETTES, Fuseless.—Weber Electric Company, Schenectady, N. Y.

3 amperes, 250 volts.

Cleat, catalog Nos. PG121, PG122, PG131, UG121, UG122, UG131.

Concealed, catalog Nos. PG123, PG124, PG125, PG130, UG123, UG124, UG125, UG130, UG135.

Combined cleat and concealed, catalog Nos. PG134, UG134.

Moulding, catalog Nos. PG126, PG128, PG129, PG132, PG133, UG126, UG128, UG129, UG132, UG133.

Conduit box, catalog Nos. PG127, PG137, PG139, UG127, UG136, UG137, UG138, UG139.

Listed February 2, 1916.

ROTARY CONVERTER.—Northwestern Electric Company, 611-15 West Adams Street, Chicago, Ill.

Martin rotary converter and emergency panel consisting of a rotary converter, transformer and switches whereby arc lamps may be connected either to an A. C. or D. C. circuit. 2.5 to 7.5 kilowatts, 110, 220, or 440 volts, 25, 30, or 60 cycles, A. C.

Standard when installed in a fireproof compartment, separate from moving picture booth.

Listed January 13, 1916.

SOCKETS, Standard.—E. H. Freeman Electric Company, Trenton, N. J.

Brass Shell.

Pull, 250 watts, 250 volts, catalog Nos. 171, 172, 173.

Listed January 7, 1916.

SOCKETS, Standard.—The Bryant Electric Company, Bridgeport, Conn.

Bryant or Perkins metal shell.

Pull, 250 watt, 250 volts, catalog No. 4116.

Listed January 13, 1916.

SWITCHES, Fixture.—The Cutler-Hammer Manufacturing Company, Milwaukee, Wis.

Single-pole; 3 amperes. 250 volts; 6 amperes, 125 volts; Catalog Nos. 7300, 7302. 7304. 7312.

Listed January 12, 1916.

SWITCHES, Oil Break.—Crocker-Wheeler Company, Ampere, N. J.

Oil switches for starting alternating-current motors of a 2 to 75 horsepower, 110 to 550 volts, type AX. Oil-immersed switches in metal cases, with no-voltage release coils and either with or without overload release devices.

Listed December 23, 1915.

SWITCHES, Pendant Snap. — The Cutler-Hammer Manufacturing Company, Milwaukee, Wis.

Single-pole; 3 amperes, 250 volts, 6 amperes, 125 volts, catalog No. 7310.

Listed January 11, 1916.

SWITCHES, Surface Snap. — The Connecticut Electric Manufacturing Company, Bridgeport, Conn.

Single-pole, 3 amperes, 250 volts; 6 amperes, 125 volts; catalog No. 11014.

Listed January 19, 1916.

SWITCHES, Surface Snap. — The Cutler-Hammer Manufacturing Company, Milwaukee, Wis.

Single-pole; 6 amperes, 125 volts, 3 amperes, 250 volts; catalog No. 7320.

Listed January 10, 1916.

TIME RECORDING SYSTEM.—Gisholt Machine Company, Madison, Wis.

A time register system consisting of a master clock with a contact device, the closing of which actuates registers located in various parts of buildings. Periodograph. 3 amperes, 250 volts.

Standard for use when wired in accordance with Class C specifications of National Electrical Code.

Listed January 12, 1916.

PERSONAL AND BIOGRAPHICAL

MR. HARRY W. M'DOWELL has been elected president of the Lambertville Water Power Company, Lambertville, N. J.

MR. JOSEPH WOODWARD has been appointed city electrical superintendent of Nicholasville, Ky., succeeding MR. EDWARD GLASS. The city operates an electric lighting plant.

MR. CHARLES L. RYDER, JR., and MR. GEORGE F. GRAVES have organized the Ryder & Graves Electrical Company, Plainfield, N. J. The company will engage in electrical engineering work.

MR. JOHN A. BENSEL, former state engineer and surveyor, state of New York, has been appointed to superintend the development of a municipal hydroelectric plant for the city of Oswego, N. Y.

MR. SAMUEL INSULL, president of the Commonwealth Edison Company, Chicago, Ill., addressed a joint meeting of the Electrical League of Cleveland and the Cleveland Advertising Club at the Hotel Statler March 1.

MR. S. G. THOMPSON, formerly in the electric vehicle department of the Public Service Company, Newark, N. J., is now special transportation engineer for the White Motor Vehicle Company, Cleveland, O.

MR. W. E. PLAYTER has recently been appointed superintendent of the Collinsville plant of the Southern Illinois Light & Power Company. Mr. Playter at one time was superintendent of the Mayfield Water & Light Company, Mayfield, Ky.

MR. T. L. MILLER, formerly in the purchasing and car maintenance department of the Toledo (O.) Railways & Light Company, has been appointed manager of the New York office of the Sangamo Electric Company, 50 Church Street.

MR. R. G. HOWE, formerly with the Otis Elevator Company, and MR. F. C. WHITNEY, with the Enterprise Electric Company, have severed their connections with their respective firms and have formed the Elevator Service & Electric Company, in Grand Rapids, Mich.

MR. E. C. JOHNSTON, formerly assistant purchasing agent of the Columbus Railway, Power & Light Company, Columbus, O., has been appointed purchasing agent of the East St. Louis & Suburban Railway, East St. Louis, Ill., and will have charge of all storerooms.

MR. ANDREW F. POPE, of Hull, Mass., has been appointed manager of the Hull municipal electric light plant, and succeeds MR. HARRY B. WILLARD, who has had charge of the plant almost from the time it started, about 22 years ago. The change in management took place March 1.

MR. N. G. NICOLL, formerly in charge of the specialty department of the Cutler-Hammer Manufacturing Company in eastern territory, has resigned to become manager of the Rubes Electric Devices, Inc., 220 Taffe Place, Brooklyn, N. Y. The latter company has recently been incorporated.

MR. ELMER A. SPERRY, president of the New York Electrical Society and a member of the Naval Consulting Board, spoke before the Society February 25 on "The Principles and Operation of the Gyroscope." The application of the gyroscope as a stabilizer for water and air craft was illustrated.

DR. EDWARD P. HYDE, director of the Nela Research Laboratory, National Lamp Works of the General Electric Company, Cleveland, O., is delivering a series of lectures on problems concerning illumination before the engineering faculties and students of a number of universities in the Middle West. Dr. Hyde is prominent in the world of science, being president of the United States National Committee of the International Committee on Illumination, vice-president of the International Commission on Illumination, past president of the Illuminating Engineering Society, and a member of the American Institute of Electrical Engineers, American Physical Society, American Electrochemical Society, Illuminating Engineering Society, Franklin Institute and the American Gas Institute.

Edward P. Hyde.

MR. M. B. BENSON, who was elected president of the newly organized Lake Superior Electrical Company, Superior, Wis., is the inventor of a flashlight system of signals for use on vessels, to be manufactured by the company. The new concern will do electrical manufacturing and contracting, making a specialty of marine and dock installations of electrical apparatus.

MR. GEORGE S. QUINAN has been appointed engineer of the Puget Sound Traction, Light & Power Company, Seattle division, in charge of the engineering department. Under the head of this new department will be grouped all engineering except that done by the Stone & Webster Engineering Corporation, and such minor engineering as may be found impracticable to separate from the operation.

MR. ERNEST S. COWIE, president and treasurer of the E. S. Cowie Electric Company, former president of the Missouri Association of Electrical Contractors, has been elected president of the Kansas City Automobile Tire & Accessory Dealers' Association. The new secretary, MR. A. J. BURNS, is also an electrical contractor. The latter is secretary of the Missouri State and of the Kansas City Electrical Contractors' Associations.

MR. EDWARD J. CHENEY, electrical engineer of the Public Service Commission, Second District of New York, spoke on "The Regulation of Public Utilities" at a meeting of the Schenectady (N. Y.) Section, A. I. E. E., February 23. Mr. Cheney told why public utility corporations are regulated and the problems involved, and described the activities of public service commissions in seeking to secure justice for the public and utility corporations.

MR. MAX LOEWENTHAL, a well known consulting and manufacturing electrical engineer who has for several years made his headquarters upon the Pacific Coast, has become connected with the Dohrmann Commercial Company, of New York and San Francisco, in an advisory capacity as an electrical specialist. The company operates a number of merchandising establishments and Mr. Loewenthal's work will be to establish electrical departments where they are not now in existence, and to reorganize those already operating.

MR. W. C. WING, Chicago sales manager of the Franklin Electric Manufacturing Company, of Hartford, Conn., is recovering from the almost fatal accident which he suffered at Barrington, Ill., on February 12. Mr. Wing, in stepping from the station wagon, was thrown between the wheels and badly injured. After a splendid fight his relatives and the physicians were able to bring him back to consciousness, and he is now resting quietly at the home of W. R. Topliff at Barrington, where it is expected it will be necessary for him to remain for several months.

OBITUARY.

MR. JOHN M. ESHLEMAN, lieutenant-governor of California, and formerly president of the Railroad Commission of that state, died at Indio, Cal., on February 28, in his fortieth year.

MR. GEORGE E. MILLER, general superintendent of the Lehigh Valley Transit Company, died in Allentown, Pa., February 22, aged 49 years. Prior to accepting the Lehigh Valley company superintendency Mr. Miller was superintendent of the Union Electric Company, Dubuque, Iowa.

CURRENT ELECTRICAL NEWS

Weekly Record of Construction Activities

Advance Information Gathered From Every Section of the Country Showing the Extent of Spring Construction Work to Be Undertaken by Electric Light and Power, Electric Railway, Telephone and Telegraph and Industrial Corporations of Every Description

NORTH ATLANTIC STATES.

PORTLAND, ME.—The Cumberland County Power & Light Company will develop a water-power site owned by the company on the Saco River at Hiram, Me. A 3,000-kilowatt unit will be installed, together with the necessary power-plant equipment, and 20 miles of transmission line will be erected. The total cost will be about $300,000. A. H. Ford is vice-president and general manager of the company.

RUMFORD, ME.—The Rumford Falls Power Company will begin the construction of a new concrete dam early in the season. The new dam will be located several hundred feet nearer the falls than the present one. A new power station with about four times the generating capacity of the present station is being planned.

BELMONT, MASS.—The municipal electric light department, E. P. Taylor, manager, will make an expenditure of about $5,000 during the year for extensions to its distributing system.

BOSTON, MASS.—The Edison Electric Illuminating Company, C. L. Edgar, president, besides making the general extensions necessary to the growth of business, will, during 1916, build one or two substations and increase its transmission lines to some extent.

BOSTON, MASS.—The Eastern Massachusetts Electric Company was recently incorporated, with a capital stock of $250,000, by Charles H. Tenney, president, D. Edgar Manson, vice-president, Elihu A. Bradley, treasurer, and these with Howard T. Sands, directors. It is proposed to build a steel tower transmission line to connect the plants of three operating companies under Charles H. Tenney & Company's management, viz., the Suburban Gas & Electric Company, Revere, Malden Electric Company and Salem Electric Lighting Company. These plants are at a distance of about 12 miles between the farthest stations. By tying them together a more efficient use of the co-ordinated properties would result. Large increases in the capacity of the generating station at tidewater in Salem are also projected. A hearing was recently held by the Gas & Electric Light Commission on the proposed stock issue.

BROCKTON, MASS.—The Edison Electric Illuminating Company, A. F. Nelson, manager, will make arrangements to increase the capacity of its main power plant. An addition to the building will be erected, a 10,000-kilowatt turbogenerator with necessary auxiliaries installed, the bus construction rearranged and additional boiler equipment will be installed. It is planned to start work in a few weeks.

CONCORD, MASS.—The municipal light department has been requested to submit a proposal for furnishing electric power to the Strathmore Worsted Mills. About 500 horsepower would be required.

HOPKINTON, MASS.—Electric pumps will be installed at the municipal pumping plant.

LEE, MASS.—The Lee Electric Light Company is extending its transmission lines to a point about a mile beyond East Lee.

LONGMEADOW, MASS.—The town lighting committee is considering the installation of an electric lighting system in main streets here.

PALMER, MASS.—The Central Massachusetts Electric Company has recently secured a franchise for the town of Hampden and is making arrangements to extend its lines to that town. The company contemplates furnishing service for at least 50 street lamps and about 70 house-lighting customers and expects to begin service about June 1.

PEABODY, MASS.—This town will soon consider the question of increasing its municipal electric light plant. Increasing power load makes it necessary to add materially to its capacity, and it is proposed to install an 800-kilowatt exhaust steam turbine, or two 500-kilowatt units, with cooling tower. The present plant, with a rated capacity of 800 kilowatts, was recently subjected to a peak load of 1,150 kilowatts. Purchased power from a neighboring company may be considered, as an alternative to increasing the steam plant. A tie line with the plant of the Salem Electric Lighting Company is maintained for mutual benefit, and has been found advantageous on several occasions. The manager of the Peabody plant is Warren D. King.

PITTSFIELD, MASS.—The Pittsfield Electric Company is considering the extension of its service to Richmond, a distance of nine miles.

SPRINGFIELD, MASS.—Plans are being prepared by McClintock & Craig, architects, of this city, for an extension to the United Electric Light Company's power plant here. The plant will be designed to ultimately replace the old one, and will contain the most modern equipment, including turbogenerator, with jet condenser, coal and ash handling apparatus and auxiliaries.

PROVIDENCE, R. I.—The Narragansett Electric Lighting Company, Arthur B. Lyle, general manager, contemplates the installation during 1916 of a 45,000-kilowatt maximum-rated turbine with accessories, entailing an expediture of approximately $400,000.

WOONSOCKET, R. I.—The Blackstone Valley Gas & Electric Company, which is under Stone & Webster management, A. F. Townsend, local manager, contemplates the erection of a 13,000-volt transmission line and will build an addition to its power plant for the housing of high-tension transformers and switchboard equipment. Changes in the switchboard equipment of the present station will be necessary. The total cost of the new work will be approximately $60,000.

BRIDGEPORT, CONN.—The United Illuminating Company, of which C. A. Paul is manager, is arranging to make a 30-per-cent increase in its boiler and turbine room capacity. Two batteries of 1,200-horsepower boilers and a 7,500-kilowatt turbine will be installed. The material for these additions has already been purchased.

NEW BRITAIN, CONN.—The United Electric Light & Power Company, of which George F. Atwater is superintendent, is building about five miles of 11,000-volt transmission line from the Housatonic Power Company's power plant here to the Brick yards in Berlin. The line is being built for the purpose of supplying all large power customers in New Britain, and a transformer station will be built to step-down the voltage to 2,300 volts for the use of smaller power customers. From the substation of the Housatonic Power Company to the United Electric Light & Water Company's substation the 11,000-volt circuits will be in duplicate.

NEW HAVEN, CONN.—The Housatonic Power Company of New Haven has filed a petition with the Public Utilities Commission for approval of the method of construction of a power transmission line from its powerhouse at Bull's Bridge, through the towns of New Milford and Sherman to the New York state line.

AUBURN, N. Y.—The Empire Gas & Electric Company, which serves the towns of Auburn, Geneva, Lyons, Clyde, Newark, Palmyra, Weedsport, Phelps, Waterloo and Seneca, will undertake the following construction work this spring: Rebuild its 500-kilowatt hydroelectric power plant at Lyons, installing new water wheels and generating equipment; build a 1,200-kilowatt outdoor substation at Geneva; substitute motor-driven centrifugal pumps for the present reciprocating boiler feed pumps in the generating stations at Auburn and Geneva; install feeder regulators in its various generating stations and substations, install additional alternating protective devices throughout the terriory served. H. L. Coleman is general manager of the company and L. C. Reynolds is general superintendent and engineer.

GLEN FALLS, N. Y.—The Adirondack Electric Power Corporation, contemplates the rehabilitation of its properties at the following points: At Utica, N. Y., where the company has a 6,000-kilowatt steam turbine station, 8 Franklin boilers may be replaced at a cost of about $150,000. At Ballston Spa, the company will build a new substation which will furnish service to the town of Ballston and will be used as a switching station on the company's 30,000-volt transmission system. The new station will be built for 60,000 volts and its cost will be about $50,000. The construction work at Utica and Ballston Spa will be done by the Stone & Webster Engineering Corporation, Boston, Mass. For the hydroelectric plant at Spier Falls, the Adirondack Company will be in the market for one or two 6,000-horsepower water wheels. The minimum expenditure for the new work at this station is estimated at $50,000. W. A. Butterick is manager of the company.

MORAVIA, N. Y.—The Moravia Electric Light, Heat & Power Company contemplates the installation of an 80-horsepower oil engine and generator as an auxiliary to its water power plant. L. C. Reynolds of Auburn, N. Y., is consulting engineer for the company.

NEW YORK, N. Y.—The United Electric Light & Power Company, of which Frank W. Smith is vice-president, does not contemplate any construction work other than ordinary installations on consumers' premises during 1916, with the possible exception of the installation of additional incoming and outgoing feeders at its Forty-fifth Street substation.

NIAGARA FALLS, N. Y.—The construction of a new power transmission line by the Niagara, Lockport & Ontario Power Company to supply the Union Carbide Company of this city with 20,000 additional horsepower was begun recently. The length of the line will be about eight miles.

ONEONTA, N. Y.—The Oneonta Light & Power Company has made application to the Public Service Commission to extend its distributing system to Oneonta Junction and to a section in West Oneonta. Application was also made for authority to issue $65,000 in capital stock.

OSWEGO, N. Y.—The Municipal Water Service Commission, John D. Higgins, chairman, is making arrangements for the construction of a municipal power plant.

OTSEGO, N. Y.—The Town Board has voted in favor of the installation of a lighting system, which will be made by the Colliers Heat & Lighting Company.

ALTOONA, PA.—The Penn Central Light & Power Company, which is under the management of Day & Zimmerman, Philadelphia, Pa., E. B. Greene, general superintendent, expects to do the following construction work during 1916: Pole line extensions in various municipalities, about $17,000; 6,600-volt transmission line and substation equipment in Cambria County, about $31,000; 6,600-volt transmis-

sion line and substation equipment in Huntingdon County, about $39,000; 6,600-volt transmission line and substation equipment in Mifflin County, about $43,000; 45,000-volt transmission line and substation equipment in Cambria County, about $32,000; 45,000-volt transmission line and substation equipment in Mifflin County, about $7,000; 45,000-volt transmission line and substation equipment in Blair County, about $33,000; additional generating equipment in its Williamsburg and Warrior power plants about $300,000. The new generating equipment in the power plants will consist of turbogenerators, boilers and auxiliaries.

ERIE, PA.—City Engineer Briggs is preparing an estimate of the cost of extending the low and high-tension conduit systems in State Street.

HARRISBURG, PA.—Four electric service companies were given state charters recently. Three of them are to operate in Cambria County and will have offices in Portage. The fourth will supply power to Upper Alsace Township, Berks County. The Cambria County companies each have a capital of $5,000. The incorporators are W. H. Trexell, High Sparks; J. Pearce, R. Pearce and M. Pearce, Portage. The companies are the Cassandra Light Company, Portage Light & Power Company and Portage Township Light & Power Company. The fourth company is incorporated by S. D. Warriner, R. H. Wilbur and H. F. Baker, Philadelphia.

HOLTWOOD, PA.—The Pennsylvania Water & Power Company is considering plans for extensions to its hydroelectric plant here during 1916.

PITTSBURGH, PA.—The Duquesne Light Company will install during the summer two units at its Brunots Island generating station, which now has a capacity of about 100,000 horsepower. Additional equipment will be installed during the year at this plant.

TITUSVILLE, PA.—The installation of an ornamental lighting system on business streets is being considered here. If the merchants will purchase the standards the city will maintain the lamps. F. C. Johnson is superintendent of the municipal plant.

BORDENTOWN, N. J.—The Board of City Commissioners is considering the installation of new tungsten street lamps.

BUTLER, N. J.—The Fire Department, Samuel K. Owen, chief, is negotiating for the installation of an electric fire alarm system.

DOVER, N. J.—Electric light and power properties of the Eastern Pennsylvania Power Company at Dover, Bernardsville, Far Hills, Wharton and vicinity, have been acquired by the New Jersey Power & Light Company, recently organized. The new company is planning for the erection of a large generating station at Dover, to cost about $200,000. W. S. Barstow is president of the New Jersey company.

FREEHOLD, N. J.—The Monmouth Lighting Company has requested a franchise at Freehold and vicinity. The company is planning improvements and extensions to its system.

HACKETTSTOWN, N. J.—A hydroelectric power plant on Pequest Creek is planned by George Z. Williams, Independence Township, on a site recently acquired.

HIGHTSTOWN, N. J.—Borough officials are investigating the question of a municipal electric lighting plant.

NEWARK, N. J.—The Board of Public Utility Commissioners has granted permission to the Public Service Railway Company to issue $7,500,000 in stock for construction work.

PERTH AMBOY, N. J.—The Public Service Company will install an underground conduit system in the downtown district, to cost about $30,000.

PERTH AMBOY, N. J.—The Raritan Copper Company has prepared plans for an addition to its power plant.

TRENTON, N. J.—The Board of City Commissioners will install a new street-lighting system in Stacy Park, to cost about $15,000.

WILMINGTON, DEL.—The Wilmington City Electric Company is seeking permission to erect a transmission line in the vicinity of Brandywine.

SOUTH ATLANTIC STATES.

BALTIMORE, MD.—Chief Engineer Hendrick has submitted to Mayor Preston plans and specifications for the proposed hydroelectric plant in the Jones Falls Valley to supply energy in that part of the city.

WASHINGTON, D. C.—The Potomac Electric Power Company, of which L. E. Sinclair is general superintendent, contemplates making extensions to its Bennings power plant, in which will be installed one 15,000-kilowatt, 25-cycle, 6,600-volt Curtis steam turbine. In connection with this unit, there will be installed in 30,000-foot Worthington condenser with necessary auxiliaries. Work will be under the supervision of the J. G. White Engineering Corporation of New York City.

RICHMOND, VA.—The Virginia Railway & Power Company has contracted for the addition of a 12,500-kilowatt unit for its Reeves Avenue station at Norfolk, Va., to be installed during the coming summer. The company will make the necessary extensions to its transmission lines and distribution system for taking care of the anticipated growth of business. C. B. Buchanan is general manager of the company.

STUART, VA.—W. H. Clark has been granted a franchise to furnish electric service here. He is planning a hydroelectric development on Mayo River.

BLUEFIELD, W. VA.—The Appalachian Power Company, besides making the necessary extensions to its transmission and distribution lines to take care of new customers during the year, will build about 20 miles of 13,200-volt transmission line and may possibly install an 88,000-volt step-down substation during the latter part of the year. Herbert Markle is general manager of the company.

FAIRMONT, W. VA.—The Monongahela Valley Traction Company contemplates the erection during 1916 of a $60,000 terminal station at Clarksburg, to be used for passenger and express stations and general offices. The company will build three miles of railroad from O'Neill to Wolf Summit and three-quarters of a mile connecting its Wilsonburg line to the Fairmont and Clarksburg interurban lines. Smith Hood is vice-president of the company.

HUNTINGTON, W. VA.—The consolidated Light, Heat & Power Company expects to build a second transmission line from Kenova, W. Va., to Ashland, Ky. The line will be about 9 miles long and will cost about $20,000. W. R. Power is superintendent of the lighting and commercial departments.

WHEELING, W. VA.—The Wheeling Electric Company has started on the construction of a new power house designed to ultimately contain two 30,000 and four 35,000-kilowatt generators which will be installed during the coming summer, the remaining units to be purchased as they are required. Sargent & Lundy, consulting engineers, Chicago, Ill., are doing the engineering work for this plant. The company is now working on a steel-tower high-tension transmission line to connect the new plant with the city of Canton, O., a distance of about 60 miles. The proposed voltage of the new line is 75,000 volts. J. B. Garden is vice-president of the company.

KERNERSVILLE, N. C.—A municipal electric lighting plant is being considered by citizens here.

DURHAM, S. C.—The Durham Traction Company probably will install a 300-kilowatt rotary converter and additional switchboard equipment.

FLORENCE, S. C.—The Carolina Central Electric Company expects to build 12 miles of 13,200-volt transmission line during the next 60 days. The line will be of wood pole construction. F. G. Godfry is general superintendent of the company.

LATTA, S. C.—A municipal electric lighting plant will be built here during the summer. T. W. Berry is one of the commissioners having charge of the plans.

ACWORTH, GA.—This city has voted to issue bonds for enlarging and improving the municipal lighting system. F. G. Hall is chairman of the Water and Light Commission.

ATLANTA, GA.—The electric light committee of the City Council, of which W. H. Johnson is chairman, has recommended the installation of a number of new arc lamps and incandescent street lamps.

BRUNSWICK, GA.—Improvements to the municipal electric lighting plant are being planned. A motor-driven compressor and a motor-driven or turbine-driven centrifugal pump will be installed. E. R. Adams is superintendent of the plant.

COMMERCE, GA.—The establishment of electric lighting plant is under consideration by Mayor Hood and other city officials.

M'RAE, GA.—The city will hold an election March 20 to vote on the question of issuing bonds for a new power plant.

STATESBORO, GA.—The city will improve the municipal electric lighting plant here. A 250-horsepower boiler with stokers will be installed. Additional lightning arresters will also be purchased. Dan R. Gould is superintendent of the plant.

MIAMI, FLA.—The Miami Traction Company is making plans for large extensions to its railway and interurban system.

ST. PETERSBURG, FLA.—The Peninsular Engineering & Electric Company is planning to install an electric lighting plant at Melbourne, Fla.

NORTH CENTRAL STATES.

AKRON, O.—The Northern Ohio Traction & Light Company intends making the following improvements during the year: Installation of two 20,000-kilowatt turbogenerators in its main generating station; one 1,500-kilowatt rotary converter and transforming equipment in its High Street substation, and equipping a new light, power and railway substation in East Akron. Some of the equipment for these installations has been purchased. The company at the present time is building 14 miles of new transmission line, part of which has been completed. Other sections of the transmission system will be rebuilt during the year. J. G. Swain is general superintendent of power and shops.

ALLIANCE, O.—The Alliance Gas & Power Company, W. J. Rose, general manager, has recently closed contracts for a 2,000-kilowatt turbogenerator, condensing equipment and cooling tower, at a cost of about $60,000. Installation will be made in 90 days.

CINCINNATI, O.—The Union Gas & Electric Company, of which W. W. Freeman is president, expects to begin work in the near future on the construction of a new generating plant which will be the property of the Cincinnati Gas & Electric Company, but will be constructed under the supervision of the Union Company as lessee. The plans provide for an ultimate capacity of 150,000 kilowatts and the initial installation of turbines and auxiliaries will have a capacity of 60,000 kilowatts. The initial expenditure will be approximately $4,000,000. No contracts have as yet been awarded for any of the work.

CLEVELAND, O.—The Cleveland & Sharon Railway Company of Cleveland will build an electric line from Middlefield, in Geauga County, to Lockwood, Trumbull County. Representatives of the company appeared before the State Utilities Commissi[illegible]mbus and asked authority to issue stock and securities. It is proposed to issue $195,000 bonds and $75,000 stock. The estimated cost of the road is $261,000. C. A. Black is president and C. H. Felton, secretary of the company.

COLUMBUS, O.—The municipal light plant will be enlarged and the Board of Local Improvements will make recommendations for the necessary extensions.

LOCKLAND, O.—A delegation appeared before the City Council of Lockland, which is a suburb of Cincinnati, and urged that measures be taken to grant a new lighting franchise to either the International Agricultural Company or the Union Gas & Electric Company.

COLUMBUS, IND.—The City Council has voted to build an electric lighting plant at a cost of $20,000.

FT. WAYNE, IND.—It is reported that officials of the Fort Wayne plant of the General Electric Company are planning to erect four new buildings during the coming summer.

FT. WAYNE, IND.—The Ft. Wayne & Northern Indiana Traction Company has filed with the Board of Public Works, a proposal agreeing to take over the lighting of the city and guaranteeing a saving of $395,000 over present prices on a ten-year contract.

INDIANAPOLIS, IND.—The Indianapolis Light & Heat Company, Thomas A. Wynne, vice-president, has begun the construction of a new power plant that will ultimately cost about $4,000,000. The new plant will be on the site of the old plant. A 5,000-kilowatt turbogenerator, which will use steam at 250 pounds and 200 degrees superheat, will be installed in July. This unit and some of the equipment for the new plant has been purchased.

WABASH, IND.—In order to give citizens of this city the best possible lighting system obtainable, members of the City Council, in company with a representative of the Wabash Water & Light Company, will make a trip to several cities in the eastern part of the state which are lighted with the same system that has been proposed for this city.

WASHINGTON, IND.—The Electric Works, of which C. E. Dove is manager, will build a short transmission line during the summer, the cost to be approximately $500.

WESTPORT, IND.—The citizens of Westport will hold an election March 21 to decide whether they wish a municipally owned electric light plant.

ALTON, ILL.—The Council will advertise for bids for the purchase of a franchise to furnish city lighting.

AURORA, ILL.—The police committee of the City Council will ask for permission to advertise for bids for 50 new police alarm boxes.

AURORA, ILL.—The Aurora, Elgin & Chicago Railroad Company will install a 60-cycle frequency set at its Batavia power plant and will make a number of track extensions during 1916. L. B. Judson is district manager of the company.

BELLEVILLE, ILL.—Plans for construction of an ornamental lighting system around the public square are before the Board of Local Improvements. The estimated cost is about $81,000.

CANTON, ILL.—The Canton Gas & Electric Company has recently placed orders for one 400-horsepower boiler, coal and ash-handling system, overhead coal bunkers and conveyor with traveling weigh-hopper, all of which will be installed within the next few months. During 1916 the company contemplates the installation of a 2,000-kilowatt turbogenerator, a large cooling tower, coal-unloading apparatus and an artificial ice plant.

CHICAGO, ILL.—The Chicago & Northwestern Railroad has authorized the construction of 54 miles of automatic block signals between Wiscona and Fond du Lac, Wis. J. A. Peabody, superintendent of signal systems, Chicago, Ill., is drawing up the plans.

DANVILLE, ILL.—Bonds in the sum of $20,000 have been authorized to acquire a municipal light plant.

GALESBURG, ILL.—The Galesburg Railway Light & Power Company, of which R. T. Carley is general superintendent, will install during 1916 two 500-horsepower boilers, coal handling equipment and other boiler room apparatus. An 800-kilowatt direct-current railway unit will also be installed.

GIBSON, ILL.—The contract will soon be let for cluster lights for Sangamon Avenue.

HILLSBORO, ILL.—The Southern Illinois Light & Power Company, J. J. Frey, president, intends to build a three-phase transmission line from Greenville to Pocahontas, Ill., and wire the latter city, calling for an expenditure of about $27,000. At the power plant at Collinsville, Ill., which has a capacity of 1,500-kilowatts, the company expects to install a cooling tower of 2,000-kilowatt capacity and coal and ash handling apparatus. The total expenditure at this plant will be about $125,000. The company has recently incorporated the Saline Electric Company, in the southern part of the state, and will build a transmission line from Eldorado to Ridgeway, Ill., and wire the latter city, the total expenditure to be about $40,000.

PEORIA, ILL.—The Illinois Traction System, H. E. Chubbuck, vice-president, will extend the boiler house facilities at Champaign, installing two 500-horsepower boilers, conveyor system for coal and ash, a bunker system for the new boilers and 1,300-kilowatt turbogenerator with the necessary auxiliary equipment. At Danville, the company contemplates the installation of a 4,000-kilowatt turbogenerator, an extension of the engine room and of the power plant building, installing complete condensing equipment for the generator, including circulating pump, pipe lines, etc. At La Salle, it is proposed to rebuild the boiler room, install two batteries of 500-horsepower boilers, install a 3,750 or 4,000-kilowatt turbogenerator with the necessary condensing and circulating equipment, switchboard and electrical equipment to serve same, together with two installations of 2,000-kilowatt transformers designed for 33,000-volt transmission.

ROMEO, ILL.—The Public Service Company of Joliet may install a lighting system here.

RUSHVILLE, ILL.—The Council has granted a franchise to the Central Illinois Public Service Company. The company will install a lighting system here, and will furnish power for commercial purposes.

WARREN, ILL.—The Warren Light & Power Company, G. W. Scheidecker, president, is contemplating the installation of additional generating equipment. The company expects to extend its line to Gratiot and South Wayne, Wis.

DATES AHEAD.

New England Section, National Electric Light Association. Question-Box convention, Boston, Mass., March 7 and 8. Secretary, Miss O. A. Bursiel, 149 Tremont Street, Boston, Mass.

Wisconsin Electrical Association. Annual convention, Hotel Pfister, Milwaukee, Wis., March 16 and 17. Secretary, George Allison, First National Bank Building, Milwaukee, Wis.

American Society of Mechanical Engineers, Spring meeting, New Orleans, La., April 11-14. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York City.

American Electrochemical Society. Semi-annual meeting, Washington, D. C., April 27-29. Secretary, J. W. Richards, Lehigh University, South Bethlehem Pa.

Arkansas Association of Public Utility Operators. Annual convention, Little Rock, Ark., May 9-11. Secretary, R. B. Fowles, Pine Bluff, Ark.

Iowa Section, N. E. L. A. Annual meeting, Dubuque, Iowa, May 10-12. Secretary, W. H. Thomson, Jr., Des Moines, Iowa.

National Electric Light Association. Annual convention, Chicago, Ill., May 22-26. Secretary, T. C. Martin, 29 West Thirty-ninth Street, New York, N. Y.

National Electrical Contractors' Association of the United States. Annual convention, Hotel McAlpin, New York City, July 18-22. Secretary, G. H. Duffield, 41 Martin Building, Utica, N. Y.

MORENCI, MICH.—The question of issuing $30,000 electric light bonds will be submitted to a vote on March 13.

ZEELAND, MICH. — The Consumers Power Company will rebuild the system in this city and is planning the extension of the service from the city to the Highland Golf Club on West Leonard road.

DENMARK, WIS.—The Denmark Light & Power Company has been incorporated with a capital of $15,000 by J. F. Eng, H. A. Dumdey and others.

LA CROSSE, WIS.—The State Railroad Commission recently authorized the Wisconsin-Minnesota Light & Power Company of La Crosse to issue $150,000 in bonds to pay for improvements and extensions in its property in this state.

MADISON, WIS.—The Janesville & Madison Traction Company, organized to build an interurban railroad from Janesville to Portage, by way of Madison, recently notified the State Railroad Commission it had secured financial backing to enable it to construct its road and that it would ask in a short time for authority to issue securities for the money to be used in building the line. J. E. Jones of Portage is promoting the new road.

MANITOWOC, WIS.—The Public Service Commission has authorized the Oslo Power & Light Company of Manitowoc to issue $5,000 additional stock, the money to be used in improving its plant.

NEOSHO, WIS.—The Neosho Electric Company has been incorporated with a capital of $6,000 by E. J. Labuwi, Mayme Labuwi and others. The company will operate an electric lighting plant in this city.

OCONTO, WIS.—Arrangements are nearly completed for the purchase of the Oconto Electric Company's equipment by the People's Land & Manufacturing Company and the consolidation of the two plants. T. A. Pamperin, of the Peoples Land & Manufacturing Company, states that as soon as the arrangements are all completed, his company will begin the work of improving its plant and equipment. Some of the machinery now used by the Oconto Electric Company will be moved to the People's Land & Manufacturing Company's auxiliary plant, and new boilers and other machinery will be installed.

RACINE, WIS.—The indeterminate electric lighting franchise offered to the city by the Milwaukee Electric Railway & Light Company in place of the present franchise has been accepted by the City Council.

WAUKESHA, WIS.—The Waukesha Gas & Electric Company will build a two-story fireproof office building costing about $25,000. Contract for the building was awarded to Dwinnell & Laughlin of that city and work has already been started on the building. H. B. Atkin is manager of the company.

FERGUS FALLS, MINN.—The Otter Tail Power Company, C. B. Ridder, manager, is considering plans to extend its lines to Underwood, Battle Lake, Deer Creek and intervening points.

LAKE PARK, MINN.—The electric light plant here was damaged by fire recently. Repairs will be made immediately.

MINNEAPOLIS, MINN.—The Minneapolis General Electric Company will erect an addition to its present building on Fifth Street. It will cover a frontage of 22 feet, the company having purchased the property recently. General Manager R. F. Pack stated that no plans have been prepared and that the company may build a two-story addition at first.

PLUMMER, MINN.—Bids will soon be received for the purchase of electric equipment for the electric light plant here.

PRESTON, MINN.—It is reported that the Root River Power & Light Company is planning the construction of a $25,000 auxiliary plant here.

ST. PAUL, MINN.—The St. Paul Gas Light Company, of which Paul Doty is vice-president and general manager, contemplates making the following electric plant additions during 1916: Service warehouse and garage to cost about $130,000; line and pole extensions to cost about $100,000; extensions to the underground system to cost about $40,000, new electric meters to cost about $30,000. These expenditures are more in the nature of the regular construction work done by the company each year, though they include some special work for 1916.

WADENA, MINN.—The citizens have decided to install a white way system on principal business streets here.

ALEXANDER, IOWA.—The Iowa Falls Electric Company has been granted a franchise to operate in this city and Coulter, Iowa.

DUBUQUE, IOWA.—The Union Electric Company will construct a number of short transmission lines and will make the necessary extensions of primary circuits and increases in the number of transformers, meters, etc., to take care of the growth of business during 1916. E. M. Walker is general manager of the company.

CAMBRIDGE, IOWA.—W. A. Curtis, owner of the local lighting plant, is planning to make transmission-line extensions.

IMOGENE, IOWA—The question of issuing bonds for the construction of a municipal electric light plant will be submitted to vote of the people.

JEFFERSON, IOWA — The Jefferson Electric Company, Percy Gray, manager, contemplates the installation of underground wiring for electroliers to be erected during the summer.

KEOKUK, IOWA—The Keokuk Electric Company is planning to make a number of improvements to its properties during the coming summer. Power-house and track facilities will be improved. When the Keokuk-Hamilton bridge is completed a new trolley and supports will be erected on the structure.

MAQUOKETA, IOWA—The Maquoketa River Power Development Company has been organized here with a capital of $50,000 by Robert M. Rogers and L. B. Jessup.

MUSCATINE, IOWA—Improvements entailing an expenditure of approximately $30,000 are to be made at the power plant of the Muscatine Lighting Company during the present year, according to H. C. Blackwell, superintendent of the company. Plans for the improvements which are the most extensive ever considered here are being formulated and it is proposed to make requisition for the materials at once. New boilers, new steam turbines, new condensers and other machinery are to be installed. The plant itself is to be completely remodeled.

RED OAK, IOWA—The Red Oak Electric Company, of which E. P. Steen is general manager, will build a substation and distribution system in the town of Hancock during the next two months at the cost of about $2,500. The company will also build 11 miles of 33,000-volt transmission line from Tabor to Sidney at the cost of about $12,000. The switchboard at the Red Oak power plant will be remodeled at a cost of $1,000.

WATERLOO, IOWA—The Citizens Gas & Electric Company has been granted a new 25-year franchise. The company will expend over $500,000 for labor and material in Waterloo between now and January 1, 1917, and completely erect and equip a high-voltage electric power plant which

will furnish light and power not only to Waterloo but to several other cities. Austin Burt is manager.

BROOKFIELD, MO.—The Brookfield Electric Light Company contemplates the erection of a new boiler room during the next few months and will probably install a new 350-horsepower boiler. Percy W. Markham is manager of the company.

GORIN, MO.—Piles & Brown, who own the local electric lighting plant, will install additional generating equipment.

KANSAS CITY, MO.—Forty-seven ornamental trolley-pole bracket lights will be placed on Broadway. James Stannard is chairman of the Light Committee.

MT. VERNON, MO.—An expenditure of $8,500 will be made to remodel the electric lighting plant in this city.

OREGON, MO.—The St. Joseph Transmission Company, of which M. R. Martins is general manager, is making plans to construct 50 miles of transmission line and develop 1,000 horsepower.

ST. CHARLES, MO.—The American Light & Power Company, F. E. Murray, local manager, is making plans to extend its transmission lines to Wentworth and Wright City.

ST. LOUIS, MO.—The Union Electric Light & Power Company contemplates the installation of a 20,000-kilowatt turbogenerator which has been contracted for with the General Electric Company. The necessary boilers and other power plant accessories will be provided for this unit.

SEDALIA, MO.—The City Light & Traction Company will rebuild a portion of its downtown feeder system and will make a number of extensions in the outlying districts. The company will also electrify its ice plant. H. D. Truesuff is treasurer.

WENTZVILLE, MO.—The American Light & Power Company, F. E. Murray, district manager, St. Charles, Mo., is planning to construct an electric lighting system here.

COUNCIL GROVE, KANS.—The Council Grove Ice, Light & Power Company, G. W. Harlan, president, will build a six-mile extension of its transmission lines.

DODGE CITY, KANS.—The Midland Water Light & Gas Company has recently purchased material to build 30,-miles of 23,000-volt transmission line to serve two or three neighboring towns. The company has also purchased a new switchboard and will probably buy a new generating unit complete, the latter to be about 250-kilowatt capacity. Otto Theis is manager of the company.

ELLIS, KANS.—The Municipal Lighting Department, R. C. Hall, superintendent, is planning to install a 100-kilowatt, 2,300-volt alternator and other generating equipment.

HIAWATHA, KANS.—The Hiawatha Light, Power & Ice Company is preparing to install additional generating machinery to provide energy for proposed extensions to its service.

HUTCHINSON, KANS.—The United Water, Gas & Electric Company is planning to extend its electric service to the towns of Kent, Buhler and Inman.

LA HARPE, KANS.—James MacDonald has made application for a franchise to furnish La Harpe with electric service for lighting and power.

MANHATTAN, KANS.—James F. Johnson, representing interests said to be located at Lincoln, Neb., is securing water rights on the Blue River northward from Manhattan, with the purpose, it is reported, of building four dams for the generation of electrical energy for supplying small towns and rural communities.

MEADE, KANS.—The Meade Light & Power Company is planning the installation of two small generating units.

OLATHE, KANS.—Bonds in the sum of $50,000 have been voted for a municipal lighting system.

PERRY, KANS.—The municipal power plant, F. W. Bettys, superintendent, will probably install a 35-kilowatt, engine-driven generating unit.

SALINA, KANS.—The Salina Light, Power & Gas Company will install a 1,250-kilowatt turbogenerator with surface condensors, a 25-kilowatt turbine-driven exciter, additions to switchboard, a 600-horsepower water-tube boiler and 1,700 feet of double pipe line for the condensing water service. These improvements will be made during the spring. J. E. Harsh is general manager of the company.

WICHITA, KANS.—The Kansas Gas & Electric Company, of which H. S. Sladin is manager, plans the construction of 10 miles of 60,000-volt transmission line and 6 miles of 22,000-volt transmission line, the total cost of which will be about $25,000. The company also plans to construct several outdoor 60,000-volt substations of about 400-kilowatt capacity, each costing about $14,000. The company's plant at Cherryvale will be enlarged to make provision for an additional 300-kilowatt unit at an estimated cost of $18,000. Additional construction work of an extensive nature is also contemplated, but plans have not been entirely formulated.

OMAHA, NEB.—The Omaha Electric Light & Power Company has submitted a proposal to the City Council for the maintenance of the street lighting system for five years. The plan contemplates the installation of 786 additional lamps, some of which will be extensions to the ornamental system.

SYRACUSE, NEB.—J. A. Martz, of Lincoln, is preparing specifications for a $6,000 electric lighting plant for this city.

YORK, NEB.—The York Gas & Electric Company, J. B. Harvey, general manager, has under construction about 32 miles of 33,000-volt transmission line and has ordered material for 50 miles of similar construction to be done during the summer. The company contemplates the installation of additional boiler, engine and generating equipment in its present plant, the construction work to be completed by fall.

NORTHVILLE, S. D.—Plans are being prepared for the erection of municipal lighting plant here.

TIMBER LAKE, S. D.—S. J. Simonson has been granted a 20-year franchise to operate an electric lighting plant here.

DAZEY, N. D.—A proposition to secure electric service for this city is being considered by the citizens. E. A. Duff and J. E. Jacobson are circulating a petition.

DUNN CENTER, N. D.—Plans have been drawn and equipment will be ordered for an electric lighting plant to be installed in a mill to be erected here by C. L. Smith.

HAZLETON, N. D.—Plans are being made by the local lighting company for increasing the capacity of the electric lighting plant.

SOUTH CENTRAL STATES.

BOWLING GREEN, KY.—The Kentucky Service Company will install a 1,000-kilowatt, 2,300-volt turbogenerator at its Hopkinsville plant. At the Bowling Green plant two 625-kilowatt, 2,300-volt turbogenerators will be installed. These units have been purchased and will be installed during the summer. D. Fitch is general manager of the company.

FULTON, KY.—The Kentucky Light & Power Company has been organized here by O. L. Foster, C. M. Goheen and E. S. Hodgman. The capitalization is $250,000.

GLASGOW, KY.—The Glasgow Electric Light & Ice Company, B. G. Dickinson, manager, will install additional equipment in its power plant.

LOUISVILLE, KY.—The Louisville Gas & Electric Company, of which Donald McDonald is manager, will build an addition to its Waterside power plant and will install at 15,000-kilowatt turbogenerator with complete equipment of boilers, condensers and other auxiliaries. In addition, the company will build a new circulating water supply system for condensing purposes. This will consist of two nine-foot-square tunnels, each 700 feet in length, extending from the station to the Ohio River, with suitable screen chamber on the station property. The total cost of the work will be approximately $1,000,000.

MAYFIELD, KY.—The city is to act on a proposition to issue bonds for the purchase of the Mayfield Water & Light Company.

PRINCETON, KY.—The Princeton Light Company, through W. J. Holman, was the purchaser of the franchise for light and power service in Caldwell County.

RUSSELL SPRINGS, KY.—The business men are in favor of a municipal lighting system. S. Wilson is enterested in the plan.

NASHVILLE, TENN.—The Tennessee Power Company has formulated plans for its proposed hydroelectric development on Caney Fork River, near Great Falls, Tenn. Construction will include a dam across the river and a tunnel to convey water through a mountain to the power house, the initial installation to develop 10,000 horsepower. The ultimate plans are for a capacity of 40,000 horsepower. Plans are also being considered for another hydroelectric development, this plant to be located on the Ocoee River.

ANNISTON, ALA.—It is reported that the Alabama Power Company will build another electric furnace here.

BIRMINGHAM, ALA.—The City Commission is considering the establishment of electric light plant for south side of the city. Julian Kendrick, city engineer, has charge of the plans.

HURTSBORO, ALA.—Extensions to the municipal power plant and waterworks system will be made to cost $6,000.

LUCEDALE, MISS.—Mayor C. E. Ward is considering plans for the erection of an electric lighting plant here.

PINE BLUFF, ARK.—The Pine Bluff Company, of which Byron C. Fowles is general superintendent, will spend about $30,000 during 1916 for track extensions.

ALGIERS, LA.—The Algiers Railway & Light Company, of which H. D. Emmon is general manager, will make additions to its rolling stock and improvements to its power plant facilities.

GLENNORA, LA.—T. P. Joseph, of White Castle, La., has submitted plans to the City Council for an electric lighting plant here.

LEESVILLE, LA.—The Leesville Light & Waterworks is planning to install a 125-kilowatt, 2,300-volt, direct-connected, engine-driven alternator. W. K. Ferguson is superintendent.

NEW ORLEANS, LA.—The municipal grain elevator, to be constructed here by the port of New Orleans at a cost of $700,000, will have all its moving apparatus driven by electricity. The F. E. Newbery Electric Company, Houston, Tex., A. T. Vick, manager, has secured the contract for the electrical work, which will cost $37,000, exclusive of electrical appliances.

VILLE PLATTE, LA.—The Town Council is considering ways and means ,to provide funds for the erection of an electric lighting plant.

HENNESSEY, OKLA.—F. H. Tathwell contemplates purchasing the Hennessey Electric Power & Ice Company's plant, which is operating under lease. The company will be re-organized, an addition to the lower plant erected and new equipment installed.

MUSKOGEE, OKLA.—Mayor Franklin Miller has been authorized to employ an electrical engineer to ascertain the physical cost of the lighting plant of the Muskogee Gas & Electric Company. The plant may be purchased by the city.

SHAWNEE, OKLA.—The Shawnee Gas & Electric Company, C. S. Thompson, general manager, expects to install a new turbine of approximately 1,000-kilowatt capacity and condensing apparatus of the jet type to go with same. The company will rebuild part of its transmission system during the summer, material for this work having been purchased.

WISTER, OKLA.—Bonds in the sum of $7,000 have been authorized for a municipal electric lighting plant.

WOODVILLE, OKLA.—The city is planning to vote on $8,000 bonds to construct an electric lighting plant. Claude D. Jackson, president of the Board of Trustees, is in favor of the establishment of a municipal plant.

BENJAMIN, TEX.—J. C. Copeland will install an electric light plant in this city.

DALLAS, TEX.—Mayor Henry Lindsley has declared in favor of offering a new franchise to parties who will construct a street railway system and electric light plant in competition with the existing properties of the Stone & Webster Engineering corporation of Boston, Mass. If this plan is not adopted he may submit a proposition for the city to purchase these public utilities.

DALLAS, TEX.—The Texas Power & Light Company is making preparations to connect its north transmission line substation at Jenkins to the Trinity Heights substation on the south transmission line. The company will also build a line from Trinity Heights to Forney, which will serve several towns between Trinity Heights and Terrell and will also furnish electricity to Terrell. The Terrell Electric Company, as announced in the issue of February 5, will build the line from Terrel to Forney to connect with the Texas Power & Light Line. The connection between the north and south transmission lines of the Texas Power & Light Company will be the second connection and will make a complete line from Denison to Thorndale, Tex., a distance of about 300 miles.

HEDLEY, TEX.—The Texas Southern Electric Company contemplates the establishment of an electric light plant or a transmission line. Consult A. L. Chase.

Clarendon, Tex., is manager of the company.

HEREFORD, TEX.—A municipal power plant is being planned for this city.

KERRVILLE, TEX.—The Kerrville Electric Light, Heat & Power Company, T. Holdsworth, manager, is installing an oil engine and other equipment.

McKINNEY, TEX.—The Texas Power & Light Company has recently started work on a new substation which will serve this city. The local municipal electric plant was recently sold to the company.

PLAINVIEW, TEX.—Extensions to the lighting system here are being contemplated by the Texas Utilities Company.

RIO GRANDE CITY, TEX.—An electric lighting plant will be installed here in the near future.

SAN ANGELO, TEX.—The San Angelo Water, Light & Power Company is having plans made for the construction of a large central electric power station here. It will also build a system of power transmission lines to towns in this section and to the different farms for operating irrigation pumping plants.

WICHITA FALLS, TEX.—A new turbine will be installed in the plant of the Wichita Falls Electric Company. Electric service from the Wichita Falls plant is now being given to the towns of Electra, Iowa Park and Burkburnett.

WESTERN STATES.

LAMBERT, MONT.—A committee has been appointed to make investigations to determine the cost of installing a municipal electric lighting plant and water works system in Lambert.

TROY, MONT.—The power site and water rights of the company owning the Lake Creek Falls power project has been sold to Leo Greenough and associates, controlling the Banner and Bangle mines. A transmission line will be built to the mines for power and lighting purposes.

BOULDER, COLO.—Extensive improvements are contemplated by the Western Light & Power Company to its plants, involving an expenditure of about $140,000.

DENVER, COLO.—Work is now under way for extensive improvements to the lighting system of the Denver Gas & Electric Light Company, which will involve an expenditure of about $160,000. The plans provide for a three-phase, four-wire, grounded-neutral, 4,000-volt system, replacing the single-phase, 2,000-volt system now in use. New equipment, including switchboard, is being installed at the West Side and Lacombe Stations.

PUEBLO, COLO.—The Arkansas Valley Light & Power Company, of which W. F. Raber is vice-president and general manager, expects to build an addition to the power plant at Canon City, installing a 7,500-kilowatt steam turbine, together with transformers, switchboard, boilers, condensers and coal and ash-handling apparatus. The company will also build 25 miles of high-tension transmission line from Canon City to the Cripple Creek district and 25 miles of transmission line in the Arkansas Valley east of Pueblo. The total expenditure will be approximately $500,000.

TRINIDAD, COLO.—The Trinidad Electric Transmission, Railway & Gas Company, of which Franklin P. Wood is manager, has recently closed a contract with the Colorado Fuel & Iron Company for additional power. The former company will make an expenditure of about $200,000 for generating equipment and transmission lines, and the Fuel Company will spend about $100,000 for substation work, motors, rotary converters and other equipment.

ALBUQUERQUE, N. M.—The City Electric Company will order additional rolling stock for the new University line, which will be put in operation June 1.

CASA GRANDE, ARIZ.—As the result of an election this city will have a municipal light, water and ice service. Bids for the construction of the plant will be called for soon.

FLORENCE, ARIZ.—At an election to be held March 11 the proposal to issue $50,000 in bonds for the installation of a municipal electric-light plant and waterworks system will be submitted to the voters.

HOLBROOK, ARIZ.—The application of James J. Shumway for a franchise to construct an electric light and power plant in Snowflake to serve the towns of Taylor, Shumway and Snowflake will be heard by the Supervisors of Navajo County on March 6.

HAILEY, IDAHO.—I. E. Rockwell, of Bellevue and D. F. McGee, chief engineer of the consolidated power and electric plants in Southern Idaho, have been making a tour of the properties in Idaho with a view of extending the Shoshone power line through to Hailey.

TWIN FALLS, IDAHO.—The Great Shoshone & Twin Falls Water Power Company, Twin Falls, contemplates rebuilding its distribution lines, owing to the consolidation of the properties of the Electric Investing Company. Connection of primary lines between two companies is also contemplated.

EPHRATA, WASH.—C. A. Logg has announced his intention of equipping an electric light plant and furnishing service to this community.

EVERETT, WASH.—A notice has been filed with County Auditor, by J. L. Fountain, of Seattle, representing, it is reported, a British Columbia syndicate, appropriating 10,000 cubic feet of water per second on the Sauk River, same to be used for hydroelectric development. According to reports, the British Columbia company plans early construction at the site.

SPOKANE, WASH.—Announcement has been made by the East Caledonia Mines Company that the gasoline power now in use is to be replaced by a complete electrically driven outfit.

BAKER, ORE.—The City Engineering Department has been instructed by City Commissioners to immediately prepare plans for the installation of a cluster lighting system in the business district of the city, current for the new system to be supplied by the municipal lighting plant.

EUGENE, ORE.—The City Council will shortly receive bids for materials for the installation of an ornamental lighting system on Eighth Avenue, from Willamette to Pearl Streets. The work of installation will be handled by the Water Board.

OPPORTUNITY, WASH.—D. W. McDonald was recently re-elected director of the Modern Electric Water Company, which recently held a meeting of stockholders in this city. It is reported that the company plans the installation of electric and other improvements. A. B. Hauk is superintendent.

PORTLAND, ORE.—The Pacific Power & Light Company, which operates a steam and hydroelectric system in Oregon and Washington, plans to spend about $260,000 in plant account during the year. Of this sum approximately $75,000 will be spent for ordinary service extensions in the electricity, gas and water departments, and approximately $80,000 additional for miscellaneous extensions. The largest single items of importance will include the reconstruction of Moxee substation, North Yakima, Wash., to a standard outdoor type, including additional transformer capacity, at a cost of about $6,000. The company expects to reconstruct its Naches-North Yakima 2,500-volt transmission line and raise the voltage to its standard of 66,000 volts, at a cost of about $15,000. The reconstruction of woodstave pipe lines at the Walla Walla River power plant will cost about $15,000, and $2,000 will be allowed for the reconstruction of the substation at Sunnyside, Wash. The overhead system at Astoria, Wash., will be reconstructed at a cost of $8,000. Some of the work outlined is already under way and the company hopes to get its new construction work completed before the summer is over.

SILVERTON, ORE. — The Willamette Valley division of the Portland Railway, Light & Power Company has signed contracts for lights with residents of East Silverton and the work of extending the lines will begin at once.

BAKERSFIELD, CAL. — The Pacific Power & Light Corporation was the only bidder for a power line franchise to supply the Kernville district, and it was granted the franchise by the County Supervisors.

DEL REY, CAL.—A road lighting system will probably be established here.

PARLIER, CAL.—An election will be held March 14 to decide the question of establishing a municipal electric lighting plant.

PETALUMA, CAL.—The special election held last week in the Cinnabar district for the purpose of forming a public highway lighting district carried.

PORTERVILLE, CAL.—It is declared here that the Porterville Northeastern Railroad proposes to extend its lines north from Adobe station and run a long semicircle to skirt the foothills, connecting with the Visalia electric at Merryman station, the plan being to operate the lines electrically.

LOS ANGELES, CAL.—The City Attorney has been authorized by the City Council to begin condemnation proceedings for the acquiring of a right of way for the construction of electric power lines in the San Fernando Valley.

SAN FRANCISCO, CAL.—The California-Oregon Power Company, which represents a merger of a number of power companies in which J. D. Grant is interested, is planning to raise funds to complete its power plant at Copco, on the Klamath River. Over $1,000,000 has already been expended on the plant.

SAN FRANCISCO, CAL.—According to John A. Britton, general manager of the Pacific Gas & Electric Company, with the advent of spring the company will put to work many more men on its construction undertakings in Placer County, where approximately 200 men are employed at present. He says the work in that section will be completed by November 1 of this year, barring any unlooked for delays.

STOCKTON, CAL.—The Western States Gas & Electric Company, Samuel Kahn, vice-president and general manager, will spend between $50,000 and $75,000 in the general work of extensions and improvements during 1916.

CANADA.

ST. STEPHEN, N. B.—The substitution of nitrogen lamps for the arc lamps now in use in Fredericton is being considered, and one of the alternative propositions made by the Fredericton Gas Light Company would involve, if accepted, the purchase of a new dynamo, two transformers, two rectifiers and other supplies.

MONTREAL, QUE.—The Montreal Public Service Corporation is planning extensive improvements to its power plant.

AMHERSTBURG, ONT. — The Town Council is considering extensions to the lighting system.

NIAGARA FALLS, ONT.—The Ontario Power Company is planning to construct another pipe line and increase its capacity to 180,000 horsepower, with the addition of two generating units. The pipe line, which will be constructed by the company itself, will be about 6,000 feet long and will parallel the two present lines. It will be of concrete, 18 feet in diameter. When the contemplated improvements are made the equipment of the Ontario power house will include 16 units. The largest unit now in operation has a capacity of 14,000 horsepower.

Proposals

ELECTRIC-LIGHT POSTS.—Sealed proposals will be received by the South Park Commissioners, Fifty-seventh Street and Cottage Grove Avenue, March 15, for furnishing and delivering cast-iron electric light posts and other cast-iron electric fixtures for use in Grant Park, Chicago. Address J. F. Neil, secretary.

WIRING.—Sealed proposals will be received by the Board of Administration in its office in the Capitol Building, Springfield, Ill., March 7, for electric light and power wiring and conduit work, etc., for the power house of the Chicago State Hospital, Dunning, Ill. Plans and specifications may be obtained upon application to Martin C. Schwab, consulting engineer, Mallers Building, Chicago, Ill.

WIRING AND FIXTURES.—Sealed proposals will be opened in the office of the Supervising Architect, Washington, D. C., at 3 p. m. March 27, 1916, for a conduit and wiring system and lighting fixtures for the pure food and drug laboratories, at the United States appraiser's stores, New York, N. Y., in accordance with drawings and specification, copies of which may be had at the Supervising Architect's office or at the office of the Supervising Chief Engineer, U. S. Customhouse, New York, N. Y., in the discretion of O. Wenderoth, Supervising Architect.

ELECTRICAL SUPPLIES.—Bids will be received at the Bureau of Supplies and Accounts, United States Navy Department, Washington, D. C., for furnishing supplies at the following naval stations: Schedule 9,346—Brooklyn, N. Y., miscellaneous interior communication cable and single and twin-conductor wire. Schedule 9,351—Brooklyn, N. Y., 150 signaling searchlights. Schedule 9,353—Charleston, S. C., 750 feet three-conductor cable, 950 feet paper-insulated, lead-sheath cable and miscellaneous duplex cable. Bidders desiring to submit proposals should make application for schedules to the Bureau or Purchasing Office nearest to navy yard, where delivery is to be made.

Foreign Trade Opportunities

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C., or its offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

NO. 20087. INCANDESCENT LAMP MACHINERY.—A commercial organization in the United States has transmitted an inquiry from a man in Mexico who desires to communicate with American manufacturers of machinery for making incandescent electric lamps. He also desires quotations on glass globes for lamps, caps, carbon filaments for incandescent lamps, and glass tubes in which the wire filament is placed.

NO. 20156. TELEPHONE EQUIPMENT.—An American consular officer in Costa Rica reports a possible market in his district for telephones, equipment and supplies. The names of possible purchasers of such articles may be obtained on application to the Bureau or its district offices.

NO. 20181. ELECTRICAL EQUIPMENT.—An American consular officer in Portugal writes that a firm in his district is in the market for machines used in the cork industry; electrical equipment, such as installation material; windmills suitable to produce electrical energy; peroxide of lead used in making storage batteries, and celluloid in plates. Catalogs, quotations and full information are desired immediately. Correspondence should be in French, Portuguese, or Spanish.

NO. 20191. ELECTRIC METERS.—An American consular officer in India writes that a firm in his district desires to receive price lists from American manufacturers of meters for direct current, for use in a lighting system.

NO. 20,222. ELECTROLYTIC COPPER.—An American consular officer in the Netherlands writes that a firm in his district is in the market for electrolytic copper. Reference is given. Correspondence may be in English.

NO. 20,228. INSTRUMENTS, MACHINERY, ETC.—An American consular officer in India writes that a firm in his district desires to be placed in touch with American manufacturers and exporters of motors, generators, switchboards, incandescent mazda standard and half-watt lamps, transformers, and meters.

NO. 20,237. ELECTRICAL MACHINERY.—An American consular officer in India reports that a Government official in that country desires to be placed in touch with American manufacturers of electrical, iron and steel, and wood-working machinery; agricultural implements and hydroelectric machinery, for use in educational and agricultural institutions in India.

NO. 20,243. ELECTRICAL SUPPLIES.—An American consular officer in Spain reports that a man in his district desires to purchase, at wholesale, supplies of small articles for electrical installation. Reference is given. Correspondence should be in Spanish.

New Incorporations

MARION, S. D.—The Heib Electric Service Company. Capital, $5,000. Incorporators: John Heib and others.

MEMPHIS, TENN.—The Street Electric Company. Capital, $10,000. Electrical supplies. Incorporators: R. A. Street, W. S. Counsell and others.

NEW YORK, N. Y.—Yorkville Electric Appliance Company. Capital, $10,000. Incorporators: J. Hochman, H. P. Karlindecker and R. Hoffman, all of New York City.

CHICAGO, ILL.—The Vesta Battery & Equipment Company. Capital, $10,000. Manufacture batteries and lamps. Incorporators: W. S. Perry, N. C. Croshaw and P. C. Kollauf.

WILMINGTON, DEL.—General Latin-American Corporation. Capital, $3,000,000. Develop public utilities in Latin-American countries. Incorporators: S. D. Townsend, Robert Pennington and E. V. Topkis, of Wilmington.

NEW YORK, N. Y.—Hill Insulating & Manufacturing Corporation. Capital, $25,000. Manufacture insulation, accessories and auto parts. Incorporators: R. R. Hill, 302 Convent Avenue; Abbott Leach and C. G. Vogel, of New York City.

New Publications

BOILER TUBES.—Technical Paper 114 of the Bureau of Mines, Washington, D. C., is entitled "Heat Transmission Through Boiler Tubes," by Henry Kreisinger and J. F. Barkley. Methods and results of temperature measurements and heat conduction are given.

AMERICAN NEWSPAPER ANNUAL AND DIRECTORY.—N. W. Ayer & Son, Philadelphia, Pa., have issued the 1916 edition of its annual, which is a reference book for information pertaining to newspapers, magazines and trade or class publications.

THE WELDING ENGINEER.—L. B. Mackenzie, under the name of The Welding Engineer Publishing Company, 220 South State Street, Chicago, has begun the publication of a monthly periodical entitled *The Welding Engineer*. The yearly subscription is $2.00 in United States, Canada and Mexico.

SHOT FIRING.—Technical Paper 108 of the Bureau of Mines is entitled "Shot Firing in Coal Mines by Electricity Controlled From Outside," by H. H. Clark, N. V. Breth and C. M. Means. The various systems are described, recommendations made and suggested specifications given. Cost figures are given.

THE MONAD.—The American Association of Engineers, 29 South LaSalle Street, Chicago, Ill., has begun the publication of a monthly periodical called *The Monad*. The first issue, dated February, 1916, contains the proceedings of the convention held in December. The subscription price to nonmembers is $1.50 per year.

BUREAU OF LONGITUDES.—The "Annuaire pour l'an, 1916," published by the Bureau des Longitudes, Paris, France, has come to hand. It contains the usual tables and also a special illustrated article by M. G. Bigourdan on "La pression barométrique moyenne et le régime des vents en France." The price is 40 cents.

MAGNETIC ALLOYS.—The University of Illinois *Bulletin* No. 83 of the Engineering Experiment Station contains "Magnetic and Other Properties of Iron-Silicon Alloys, Melted in Vacuo," by Trygve D. Yensen. This is approximately the same material presented to the American Institute of Electrical Engineers at the St. Louis meeting last October.

Financial Notes

The Nashville Railway & Light Company, at its annual meeting, reported that the gross income for the year was $2,143,902, while gross expenses were $1,886,921. The net earnings of $256,981 were a decrease of about $8,000 in comparison with 1914. The decrease lay in the railway department, the lighting department showing an increase of $4,359.

Lee, Higginson & Company, Harris, Forbes & Company and Kissel, Kinnicutt & Company have purchased $1,000,000 Manhattan Railway Company consolidated (now first) mortgage four-per-cent bonds, due 1990, and are offering them at a price of 93 and interest, to yield 4.31 per cent. These bonds were sold to refund $1,000,000 New York Elevated Railway debenture 5s, due March 1, and practically close the consolidated mortgage of the Manhattan Railway Company.

The Wagner Electric Company for the year ending Dec. 21 showed gross and net earnings the largest in its history, net profits totaling $615,475, or 33.9 per cent on the capital of $1,800,000, compared with $259,328, or 17.5 per cent, in 1913, and $265,335, or 14.7 per cent, in 1914. Surplus after all charges and dividends was $1,195,902, of which $610,475 was added in 1915. All retiring directors were re-elected. The special stockholders' meeting unanimously approved the proposed increase in capital to $2,000,000 and plans of the directors for distributing the increase.

Announcement is made that the $12,500,000 capital stock of Detroit United Railway Company has been listed on the Detroit Stock Exchange. The stock is also listed on the New York, Montreal and Cleveland exchanges. The company has the lowest capitalization of any of the large street-railway systems of the country, and while it has made many extensions and greatly enlarged its holdings in the last few years, there has been no increase in its outstanding stock, much of the new work having been cared for out of income.

The Kentucky Public Service Company has given the city of Frankfort, Ky., $32,000 in government bonds to redeem $32,000 of first-mortgage bonds on the plant of the company, and, in addition, a 5-per-cent premium, amounting to $1,000, and a semi-annual interest installment of $480 until 1920. The company recently stated to Mayor Rupert that it desired to take advantage of the present good bond market and to give only first-mortgage security and for that reason wished to discharge the city's lien. The gas and electric bonds draw six per cent and the government bonds three; so the company is, therefore, binding itself to pay the city the difference in semi-annual payments until the bonds will have expired.

The United Gas & Electric Corporation, through the Fidelity Trust Company of Philadelphia, has called for payment April 1 at 100.5 and interest all notes outstanding of the issue of $4,500,000 due April 1, 1918. Retirement of the notes will be made from a portion of the proceeds of $5,000,000 United Gas & Electric Corporation six-per-cent 30-year bonds recently sold to Bertron, Griscom & Company and Reilly, Brock & Company. The $5,000,000 six-per-cent 30-year collateral trust bonds which United Gas & Electric Corporation has sold to New York and Philadelphia bankers are a part of an authorized issue of $15,000,000, dated April 1, 1915, of which $10,000,000, including those just sold, have been issued and $8,461,000 are outstanding in the hands of the public. The remaining $5,000,000 are held to be issued for future corporate requirements under the restrictions of the mortgage, and of the issued bonds $1,539,000 are held in the treasury of the corpporation. The collateral behind the bonds is approximately $32,276,600 par value of the common and preferred stocks of subsidiary companies.

Dividends.

	Term	Rate	Payable
Am. Pw. & Light	Q	1%	Mar. 1
Chicago City Ry	Q	2%	Mar. 30
Chicago Tel	Q	2%	Mar. 31
Colo. Power, com	—	1%	Apr. 15
Colo. Power, pf	Q	1.75%	Mar. 15
Con. Gas. El. Lt. & Pw., Baltimore, com	Q	1.75%	Apr. 1
Con. Gas. El. Lt. & Pw., Baltimore, pf	S	3%	Apr. 1
El Paso Elec	Q	$2.50	Mar. 15
Louisville Trac	Q	1%	Apr. 1
Louisville Trac., pf	S	2.5%	Apr. 1
Mont. Power	Q	0.75%	Apr. 1
Mont. Power, pf	Q	1.75%	Apr. 1
National Carbon, pf	Q	1.75%	.....
National Carbon, com	Q	2%	Apr. 5
Ottawa Lt., Ht. & Pw	Q	1.5%	Apr. 1
Ottawa Lt., Ht. & Pw.	—	1.5%	Apr. 1

Reports of Earnings.

COMMONWEALTH EDISON COMPANY.

Net earnings for the fiscal year ended December 31, 1915, amounted to 10.09 per cent

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Feb. 28	Feb. 21
American Tel. & Tel. (New York)	127⅝	127¼
Commonwealth Edison (Chicago)	143	144
Edison Electric Illuminating (Boston)	248	248
Electric Storage Battery common (Philadelphia)	64⅞	66
Electric Storage Battery preferred (Philadelphia)	64⅞	66
General Electric (New York)	169	171
Kings County Electric (New York)	129	129
Massachusetts Electric common (Boston)	6⅝	7¼
Massachusetts Electric preferred (Boston)	36	37
National Carbon common (Chicago)	180	182
National Carbon preferred (Chicago)	—	122
New England Telephone (Boston)	136	136½
Philadelphia Electric (Philadelphia)	27¾	28
Postal Telegraph and Cables common (New York)	80	80¾
Postal Telegraph and Cables preferred (New York)	67	67½
Western Union (New York)	88¼	88⅝
Westinghouse common (New York)	64⅝	66½
Westinghouse preferred (New York)	76¼	76

on the stock, which compares with 9.11 per cent in 1914.

	1915.	1914.
Oper. revenue	$20,882,327	$19,060,196
Oper. exp., inc. dep.	12,895,218	12,008,640
Net oper. revenue	7,987,108	7,051,556
Taxes and mun. comp.	1,582,039	1,492,265
Oper. income	6,405,069	5,559,291
Other income	114,393	217,762
Total income	6,519,462	5,777,053
Less int. on bonds	1,890,000	1,600,000
Available for div.	4,629,462	4,177,052
Dividends paid	3,667,110	3,534,562
Bal. carried to sur.	962,352	642,400

VIRGINIA RAILWAY & POWER.

	1915	1914
December gross	$503,449	$443,651
Net earnings	280,143	231,346
Total income	287,710	237,645
Surplus after taxes, rentals and interest	145,669	105,007
Balance after depreciation	137,336	96,674
Six months' gross	2,785,966	2,632,706
Net earnings	1,478,014	1,370,685
Total income	1,528,505	1,411,440
Surplus after taxes, sinking fund and interest	670,957	600,877
Balance after depreciation	620,957	550,877

PUBLIC SERVICE COMPANY OF NORTHERN ILLINOIS.

Net income for the fiscal year ended Dec. 31, 1915, was 15.77 per cent on the preferred stock and 7.51 per cent on the common. This compares with 14.84 per cent and 6.79 per cent, respectively, earned in 1914. Following is a comparative income account:

	1915.	1914.
Gross earnings	$ 6,903,228	$ 6,656,899
Expenses	3,749,370	3,656,685
Net earnings	3,153,857	3,000,214
Bond and note interest	1,492,280	1,461,262
Net income	1,661,577	1,538,752
Div. paid on pfd. stk.	455,280	455,280
Div. paid on com. stk.	528,287	503,125
Surplus	678,010	580,347
Appropriated for amort. and dep. reserve	450,000	400,000
Bal. carried to sur.	228,016	180,347

NIAGARA FALLS POWER.

Niagara Falls Power Company reports as follows for the fiscal year ended Dec. 31, 1915:

	1915	1914
Gross earnings	$2,685,598	$2,636,031
Expenses and taxes	788,760	773,483
Net earnings	1,896,838	1,862,548
Non-operating income less non-operating deductions	165,848	103,390
Total income	2,062,687	1,965,938
Interest, etc.	1,034,629	996,395
Surplus	1,028,058	969,543

EAST ST. LOUIS & SUBURBAN.

	1915	1914
December gross	$ 238,667	$ 213,997
Net after taxes	97,393	105,137
Surplus after charges	34,411	33,389
Twelve months' gross	2,466,969	2,623,827
Net after taxes	993,377	1,007,613
Surplus after charges	237,062	305,664

ALABAMA POWER COMPANY.
(Alabama Traction, Light & Power Subsidiary.)

	1915	1914
December gross	$ 108,738	$ 77,751
Expenses and taxes	42,731	36,556
Net earnings	66,007	41,195
Twelve months' gross	1,041,148	619,809
Expenses and taxes	402,542	312,346
Net earnings	638,606	307,463

PORTLAND RAILWAY LIGHT & POWER.

	1915	1914
December gross	$ 482,938	$ 514,493
Net after taxes	227,658	259,010
Surplus after charges	44,834	76,036
Twelve months' gross	5,511,345	6,273,171
Net after taxes	2,437,717	3,009,288
Surplus after charges	229,361	836,610

CUMBERLAND COUNTY POWER & LIGHT.

	1915	1914
December gross	$ 224,254	$ 203,510
Net after taxes	85,031	79,241
Surplus after charges	19,325	16,718
Twelve months' gross	2,636,364	2,513,620
Net after taxes	1,130,577	1,056,600
Surplus after charges	338,163	297,741

PHILADELPHIA RAPID TRANSIT.

	1915	1914
December gross	$2,213,472	$2,074,522
Net	975,804	871,858
Surplus	160,307	64,853
Six months' gross	12,416,972	11,945,123
Net	3,457,036	5,046,402
Surplus	561,243	198,447

Electrical Patents Issued February 22, 1916

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,172,244. **Insulating Material.** C. M. Abott, assignor to S. Cabot, Boston, Mass. Fire-proof insulating stud, having pair of covering sheets of sulfate of soda paper stock with incombustible, insulating filler between.

1,172,277. **Sanitary Mouthpiece Protector for Telephones.** E. R. Gorman, West Haven, Conn. Covering of separately detachable layers of fabric.

1,172,282. **Protector for Fusible Conductors.** W. Handley and O. M. Nickerson, Madison, Me. Casing for upright fuse.

1,172,286. **Key-Operating Attachment for Electric-Light Sockets.** E. G. Hayne, Ottawa, Ill. Adapts for pull operation.

1,172,294. **Relay.** C. L. Krum, assignor to Morkrum Co., Chicago, Ill. Details of polarized device.

1,172,301. **Electrical Welding.** T. E. Murray and H. R. Woodrow, New York, N. Y. Machine has roller electrodes and adjustable table for welding overlapping parts.

1,172,302. **Electrical Welding.** T. E. Murray, New York, N. Y. Machine with roller electrode for making circular line welds.

1,172,322. **Protective Device for Electric-Cable Joints.** P. Torchio, New York, N. Y. Has pervious layer saturated with insulating fluid between inner and outer sheaths. (See cut, next page.)

1,172,347. **Holddown for Storage Batteries.** B. Ford, Philadelphia, Pa. For clamping boxes in position.

1,172,354. **Portable Lamp.** W. E. Grote, New York, N. Y. Arm and lamp may be slid into and out of portable box.

1,172,364. **Combination Lighting and Ignition Switch.** W. Kaisling, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. Interlocking arrangement.

1,172,365. **Automatic Telephone Exchange.** A. Katz, assignor to Siemens & Halske, A. G. Berlin, Germany. Trunk lines are tested before selection.

1,172,366. **Automatic Telephone Exchange System.** O. Kirby, assignor to Automatic Electric Co., Chicago, Ill. Control of trunk selection by subscriber in metallic circuit-controlled trunking system.

1,172,371. **Switchboard.** H. F. Krantz, assignor to H. F. Krantz Mfg. Co., Brooklyn, N. Y. Arrangement of bus bars and switches.

1,172,377. **Car-Door Signal System.** J. F. McElroy, Albany, N. Y., assignor to Consolidated Car Heating Co., Albany, N. Y. Grounded signal circuit closed if any door is open.

1,172,382. **Telephone Attachment.** H. C. Merritt, Jr., Tuckahoe, N. Y. Accessory carrier for attachment to desk set.

1,172,384. **Timer and Distributer.** D. E. Moulton, Pierre, S. D. For ignition; structural details.

1,172,395. **Electric Signal for Automobiles.** R. B. Rudy, Niagara Falls, N. Y. Electromagnetically operated direction-indicator and tail-light.

1,172,402. **Telephone Trunking System.** C. E. Stephenson, assignor to Automatic Electric Co. Arrangement for placing guarding potential at one end of trunk when other end is seized.

1,172,409. **Electric Window Closing Device.** W. B. Uffert, Hampstead, N. Y. Gravity closing sashes held open by electromagnetically released catch.

1,172,431. **Train Control System.** A. Cansale, Scranton, Pa. Special arrangement of track, sub-rails, car circuits, etc., in train-stop system.

1,172,459. **Thermostatic Controller for Gas Water-Heaters.** H. Jarvis, Ontario, Canada. Thermostatically and electromagnetically controlled gas valve.

1,172,468. **Apparatus for Sterilizing Water.** R. M. Leggett, assignor to The Neal Armstrong Co., Akron, O. Employs alternating current.

1,172,470. **High-Tension Switch.** C. R. Lininger, Chicago, Ill. Outdoor line switch with special provision for preventing ice and sleet from interfering with operation.

1,172,515. **System of Distant Selection and Control by Means of Electromagnetic Waves.** L. B. Clark and R. A. Clark, assignors to Clark Brothers Wireless Selection & Control Co., Phoenix, Ariz. Receiving apparatus comprises motor-driven switch controlled by the receiving relay.

1,172,517. **Stator for Alternating Electric Current Machines.** J. Lassen La Cour, Vesteras, Sweden. Has rows of winding slots at different distances from air gap.

1,172,522. **Lamp Holder and Reflector.** E. F. Guth and R. V. Owen, assignors to Luminous Unit Co., St. Louis, Mo. Lamp socket supported in neck of insulating reflector.

1,172,523. **Railway Marker.** J. F. Haddock, St. Louis, Mo. Electric lantern, with adjustable bull's-eyes of different colors, repeated at will of operator.

1,172,526. **Selective Signaling System.** J. B. Harlow, assignor to Western Electric Co., New York, N. Y. Impulse-selected semaphores at way stations operated from despatching station and answer-back means.

1,172,536. **Trolley Stand.** W. H. Kilbourn, Greenfield, Mass. Trolley drops laterally to safety position when wheel leaves wire.

1,172,539. **Electrically Controlled Meter System.** J. W. Lattig and C. L. Goodrum, assignors to Western Electric Co. Call register system for automatic telephones.

1,172,541. **Tank Sounder.** P. F. McDonnell, J. Brunner and T. Thompson, Cleveland, Ohio. Electric indicator of depth of liquid in hull of ship.

1,172,568. **Method of and Apparatus for Securing Constancy in the Light of Vacuum Tubes.** F. Schroter, Berlin, Wilmersdorf, Germany. Method of rendering inactive the impurities in the light-giving gas.

1,172,581. **Motor-Driven Compressor.** H. W. Cheney, assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis. Vertical motor shaft, horizontal cylinders.

1,172,583. **Starter and Light Control for Motors.** W. H. Collier, Nashville, Tenn. Switch mechanism for controlling starting, ignition and lights of automobile, mounted on steering post.

1,172,585. **Selector Switch.** H. F. Dobbin, assignor to Western Electric Co. Arrangement of brushes and contacts in automatic switch for telephone lines.

1,172,586. **Storage Battery.** J. W. East, Teague, Tex. Plates formed of perforated tubes.

1,172,597. **Process of Producing Dephosphorized High-Grade Pig Iron.** P. L. T. Heroult, New York, N. Y. Phosphoric blast-furnace pig iron treated in electric furnace.

1,172,604. **Snap Clamp or Grip for Electrical Conductors.** T. F. Johnson, Atlanta, Ga. Connected to cable end and adapted to grip overhead conductor.

1,172,608. **Train Control Apparatus.** R. M. Kaufman, Pittsburgh, Pa. Speed control operated according to track conditions and train speed.

1,172,614. **Telephone Lock.** J. E. Lavalley, Portland, Ore. Collar about standard of desk set locks hook down.

1,172,630. **Rotary Converter.** O. H. Pieper and A. F. Pieper, Rochester, N. Y. Alternating side connected in by speed-controlled switch.

1,172,635. **Lock for Socket Shells.** R. A. Schoenberg, New York, N. Y. Prevents disconnection of bayonet point.

1,172,642. **Humidifier.** C. Subert, assignor to Sanifacient Humidor Co., Chicago, Ill. Air-circulating motor has current "flashed" on it by thermal device.

1,172,649. **Lighting Fixture.** F. W. Wakefield, assignor to F. W. Wakefield Brass Co., Vermillion, Ohio. Bowl and socket support.

1,172,650. **Water-Level Indicating System and Apparatus.** A. B. Walton, Lorain, Ohio. Single indicator connected with contact device in any one of several compartments.

1,172,658. **Attachment for Telephone Desk Sets.** L. D. Allen, Chicago, Ill., assignor of one-half to A. W. Heath, Chicago, Ill. Releasable clip for holding down receiver hook.

1,172,694. **Multiple Connector.** A. L. Flint, E. Weymouth, Mass. Multiple plug

and socket device has means for forcing members apart.

1,172,698. Ignition Apparatus for Combustion Engines. V. A. Fynn and B. Dick, assignors to Wagner Electric Mfg. Co., St. Louis, Mo. Combination of electromagnetic and mechanical interrupters.

1,172,704. Socket for Incandescent Electric Lamps. G. A. Harter, Chicago, Ill. Shell held in body and connected to terminal by metal cast onto shell and into recess of body.

1,172,705. Motor Controller. C. T. Henderson, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Master-switch-controlled electroresponsive switches for connecting alternating motor with alternating source for driving and direct-current source for dynamic braking with automatic novoltage and mechanical brake.

1,172,706. Automatic Means for Correcting the Registration of Meters. F. W. Hild, Portland, Oregon. Connection between constantly-driven friction disk and register controlled by index hand.

1,172,713. Signaling Horn. M. R. Hutchinson, assignor to Lovell McConnell Mfg. Co., Newark, N. J. Electromagnetically operated diaphragm with provision for giving successive, different sounds.

1,172,757. Electric Heater. A. O. Bailey, assignor to Gold Car Heating & Lighting Co., New York, N. Y. Mounted in car seat.

1,172,760. System of Call Distribution. H. M. Bascom, assignor to American Telephone & Telegraph Co., New York, N. Y. Automatically connects telephone set with idle call circuit.

1,172,771. Ignition System. B. Dick and V. A. Fynn, assignors to Wagner Mfg. Co. Modification of No. 1,172,698.

1,172,786. Trolley Base. C. E. Gierding, assignor to Ohio Brass Co., Mansfield, O. Pole pivoted on longitudinally movable, spring-pressed support.

1,172,821. Method of Running and Apparatus for Protecting Electrical Machines. G. Meyer and A. Kuehns, assignors to Siemens Schuckert Werke G. M. B. H., Berlin, Germany. Protective device adjusted to load capacity of machine in response to speed adjustment.

1,172,826. Panelboard Cabinet. R. H. Olley, assignor to Crouse-Hinds Co., Syracuse, N. Y. Manner of securing panel and lining strips.

1,172,845. Gearing for Starting Mechanism. J. A. Struthers, assignor to The Tri-Unit Electrical Co., Jersey City, N. J. Connects dynamo machine with engine fly wheel.

1,172,852. Electric Fire Alarm. J. L. Weathers, Shelby, N. C. Fuse-restrained contacts enclosed in combustible material.

1,172,880. Thermostat. W. L. Denio, Rochester, N. Y. Details of thermally controlled contacts.

1,172,885. Apparatus for the Production of Oxygen and Hydrogen Gases. G. Halter, assignor to Davis-Bournonville Co., New York, N. Y. Electrolytic cell having anode completely enclosed in porcelain separator above and asbestos sack below surface of electrolyte and having outlet for oxygen.

1,172,887. Electrolytic Plant. G. Halter, assignor to Davis-Bournonville Co. Modification of above.

1,172,890. Storage Battery Indicator. K. Knudsen, Grand Rapids, Mich. Gas indicator on automobile dash.

1,172,893. Starting Device for Explosive Engines. O. F. Lippincott, Kenesaw, Neb. Sparking plug comprises an explosive powder.

1,172,909. System for Auto-Vehicles. A. D. Scott, assignor to Varley Duplex Magnet Co., Jersey City, N. J. Dynamo machine driven by direct current for starting and then delivering alternating current.

1,172,910. Mandrel for Winding Coils. A. D. Scott, assignor to Varley Duplex Magnet Co. Collapsible mandrel with special strand-guiding means.

1,172,921. Automatic Counting Machine. G. W. Yost, Palisade Park, N. J. Counter controlled by article-operated contacts.

1,172,926. Insulating Substance. L. C. Bassford, assignor to General Electric Co., Schenectady, N. Y. Central strip of open weave fabric has mass of vegetable fibres pricked through, pressed and treated with water-proof and fire-proof coating.

1,172,928 and 1,172,929. Electric Switch. T. A. C. Both, assignor to R. A. Schoenbers, New York, N. Y. First patent: Two-push-button wall switch. Second patent: Simple two-push-button rosette structure.

1,172,932. Electrolytic Cell. W. C. Bucknam, assignor to Davis-Bournonville Co. Modification of No. 1,172,885.

1,172,944. Dynamo-Electric Machine. E. F. Collins, assignor to General Electric Co. Structure and excitation of direct-current machine.

1,172,953. Adapter. J. T. H. Dempster, assignor to General Electric Co. Details of device having standard base with miniature socket and transformer between.

1,172,956. Brake-Applying Mechanism. R. B. Dickard, Austin, Tex. Electromagnetic control of brake-operating arm.

1,172,961. Protective Device. S. Dushman, assignor to General Electric Co. Electric-discharge device with constant current up to certain voltage is de-energized when current in rectifier in parallel with the device rises abnormally.

1,172,962. Electromagnetic Switch. J. Eaton, assignor to General Electric Co. Differentially wound magnet.

1,172,963. Insulator. A. J. Engelhardt, New Orleans, La. Pin insulator with special wire-securing clamp.

1,172,965. Bearing for Wheels. C. M. Feist, Sioux City, Iowa. Special trolley wheel bearing.

1,172,968. Synchronous Dynamo-Electric Machines. L. Fleischmann, assignor to

No. 1,172,322.—Protective Device for Cable Joints.

General Electric Co. Starting means for rotary converters.

1,172,972. Protective Device. J. J. Frank, assignor to General Electric Co. Arrangement of inductive windings and electrolyte.

1,172,980. Electric Lamp Socket. G. W. Goodridge and G. B. Thomas, assignors to Bryant Electric Co., Bridgeport, Conn. Details of pull socket.

1,172,990. Protective Device. L. A. Hawkins, assignor to General Electric Co. Modification of No. 1,172,961.

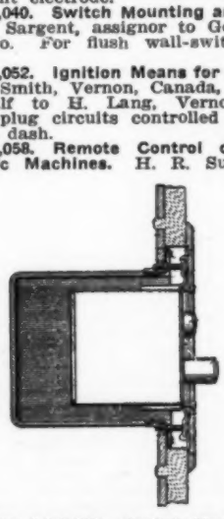
1,173,004. Electrical Apparatus. W. Kockling, assignor to General Electric Co. Special transformer winding producing zig-zag insulating and cooling passage between the coils.

1,173,005. Electrode. C. R. Krueger, assignor to General Electric Co. Luminous arc-light electrode.

1,173,040. Switch Mounting and the Like. H. R. Sargent, assignor to General Electric Co. For flush wall-switches. (See cut.)

1,173,052. Ignition Means for Gas Burner. C. E. Smith, Vernon, Canada, assignor of one-half to H. Lang, Vernon, Canada. Spark-plug circuits controlled from automobile dash.

1,173,058. Remote Control of Dynamo-Electric Machines. H. R. Summerhayes,



No. 1,173,040.—Switch Mounting.

assignor to General Electric Co. Starting rotary converters.

1,173,065. Vibrator. G. Vande, Los Angeles, Cal. Electromagnetic massage implement.

1,173,072. Automatic Fire Alarm System. W. Z. Wilkinson, Baton Rouge, La. Thermally controlled audible and general alarm and signal for indicating building.

1,173,079. Selective Tuning System. E. F. W. Alexander, assignor to General Electric Co. Method of selecting sustained oscillations of given frequency from disturbing oscillations differing in frequency.

1,173,084. Motor Car Protector. H. W. Beecher, Makanda, Ill. Key-controlled ignition and starting switches and steering shaft latch.

1,173,089 and 1,173,090. Dynamo-Electric Machine. S. R. Bergman, assignor to General Electric Co. First patent: Structure and winding of field of direct-current machine. Second patent: Arrangement of exciting and compensation windings in direct-current machine.

1,173,094. Tertiary Winding. L. F. Blume, assignor to General Electric Co. For transformers.

1,173,095. Party-Line Key. A. J. Carter, assignor to Kellogg Switchboard & Supply Co. Rocking and plunger keys interrelated for mutual restoration.

1,173,096. Lightning Arrester. F. S. Chapman, assignor to National Electric Specialty Co., Toledo, Ohio. Discharge melts solder which closes gap in ground connection.

1,173,099. Test Connector. J. Davis, Bloomington, Ill. Detachable clamp for temporarily connecting conductors.

1,173,121. Vehicle-Signaling Device. E. M. Rosenbluth, Philadelphia, Pa. Control and arrangement of electric direction-indicating lamps, audible signal and license-plate illumination for automobiles.

1,173,123. Automobile. E. M. Rosenbluth. Modification of above.

1,173,153. Dynamo Electric Machine. E. W. Stull, assignor to Allis-Chalmers Mfg. Co. Structure and arrangement of field member with commutating poles.

Patents Expired.

The following United States electrical patents expired on February 28, 1916:

620,110. Vehicle Lamp. J. W. Eisenhuth, New York, N. Y.

620,111. Cut-Out. E. B. Ellicott, Chicago, Ill.

620,117. Arc Lamp for Electric Lighting. D. Gertin, Corning, N. Y.

620,144. Multiphase-Current Transformer. E. L. K. F. Kahlenberg, Berlin, Germany.

620,172. Secondary Battery. G. Philippart, Paris, France.

620,196. Electric Time Switch. H. O. Swoboda, New York, N. Y.

620,197. Coin-Controlled Electrical Apparatus. R. W. Taylor, Sr., Chicago, Ill.

620,214. Carbon Holder for Electric Arc Lamps. S. Bergmann, New York, N. Y.

620,239. Electric Motor Suspension. G. Gibbs, Philadelphia, Pa.

620,254. Four-Tub Electric Bath. C. Schnee, Carlsbad, Austria-Hungary.

620,256. Means for Suspending Electric Motors. S. H. Short, Cleveland, Ohio.

620,257. Means for Suspending Motors. S. H. Short, Cleveland, Ohio.

620,283. Regulating Transformer. E. W. Cowan and A. Still, Bowdon, England.

620,302. Automatic Cut-Out for Electrical Transformers. W. J. Greene, Cedar Rapids, Ia.

620,305. Leuring Iron. W. S. Hadaway, Jr., New York, N. Y.

620,306. Electrically Heated Tool. W. S. Hadaway, Jr., New York, N. Y.

620,307. Process of Forming Magnesia Insulation upon Conductors. W. S. Hadaway, Jr., New York, N. Y.

620,308. Incandescent Arc Light. W. S. Hadaway, Jr., New York, N. Y.

620,309. Electric Fuse. W. S. Hadaway, Jr., New York, N. Y.

620,326. Electric Recording Apparatus. C. L. Jaeger, New York, N. Y.

620,327. Electric Recording System. C. L. Jaeger, Maywood, N. J.

620,333. Direct-Current Motor and Method of Operating Same. B. G. Lamme, Pittsburgh, Pa.

620,334. Direct-Current System of Electrical Distribution. B. G. Lamme, Pittsburgh, Pa.

620,335. Method of and Means for Varying Speed of Direct-Current Motors. B. G. Lamme, Pittsburgh, Pa.

620,336. System of Electrical Distribution and Regulation. B. G. Lamme, Pittsburgh, Pa.

620,343. Rotary-Transformer Regulation. R. D. Mershon, New York, N. Y.

620,365. Means for and Method of Electromotove-Force Regulation. N. Rowe, Wilkinsburg, Pa.

620,404. Electric Railway. L. M. Aspinwall, Pittsburgh, Pa.

620,440. Telephone Switch. W. D. Gharky, Philadelphia, Pa.

620,466. Process of Utilizing Spent Battery Solutions. J. Lones, Smethwick, England.

620,473. Electrical Machine. G. F. Martin, Corydon, Ind.

620,479. Sheet-Metal Trolley Wheel. G. E. Mettinger, Jr., Cleveland, Ohio.

620,491. Telephone Switchboard. J. M. Overshiner, Elmwood, Ind.

620,513. Combined Lighting and Alarm Device. J. Thorsen, North Aurora, Ill.

620,514. Potential Regulator for Dynamos. A. A. Tirell, Whitefield, N. H.

620,537. Coin-Controlled Mechanism for Electric Meters. W. F. Browne, New York, N. Y.

620,547. Signal System. E. L. Hall and G. Hall, Providence, R. I.

620,549. Electric Railway. J. F. Munsie, New York, N. Y.